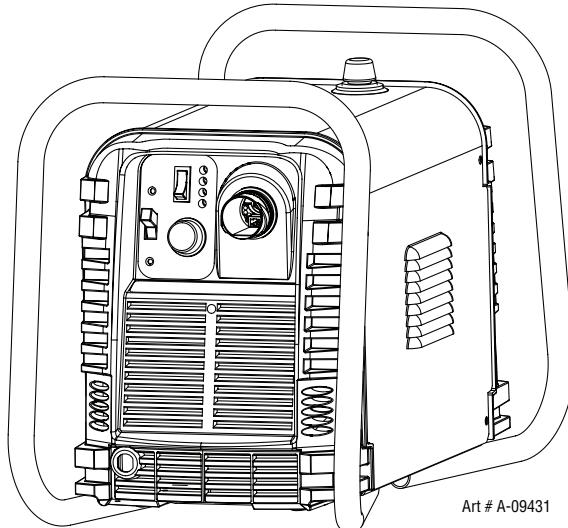


39

THERMAL DYNAMICS
®

CUTMASTER™
PLASMA CUTTING SYSTEM



Art # A-09431

Service Manual

Rev. AC
Operating Features:

Date: February 24, 2010

Manual # 0-4976

30 AMP	DC	1 PHASE	120 V	208- 230 V
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WARNINGS

Read and understand this entire Manual and your employer's safety practices before installing, operating, or servicing the equipment.

While the information contained in this Manual represents the Manufacturer's best judgement, the Manufacturer assumes no liability for its use.

Plasma Cutting Power Supply
CutMaster™ 39
SL60 1Torch™
Service Manual Number 0-4976

Published by:
Thermal Dynamics Corporation
82 Benning Street
West Lebanon, New Hampshire, USA 03784
(603) 298-5711

www.thermal-dynamics.com

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Printed in the United States of America

Publication Date: June 18, 2007
Revision Date: February 24, 2010

Record the following information for Warranty purposes:

Where Purchased: _____

Purchase Date: _____

Power Supply Serial #: _____

Torch Serial #: _____

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SECTION 1: GENERAL INFORMATION

1.01 Notes, Cautions and Warnings

Throughout this manual, notes, cautions, and warnings are used to highlight important information. These highlights are categorized as follows:

NOTE

An operation, procedure, or background information which requires additional emphasis or is helpful in efficient operation of the system.



A procedure which, if not properly followed, may cause damage to the equipment.



A procedure which, if not properly followed, may cause injury to the operator or others in the operating area.

1.02 Important Safety Precautions



OPERATION AND MAINTENANCE OF PLASMA ARC EQUIPMENT CAN BE DANGEROUS AND HAZARDOUS TO YOUR HEALTH.

Plasma arc cutting produces intense electric and magnetic emissions that may interfere with the proper function of cardiac pacemakers, hearing aids, or other electronic health equipment. Persons who work near plasma arc cutting applications should consult their medical health professional and the manufacturer of the health equipment to determine whether a hazard exists.

To prevent possible injury, read, understand and follow all warnings, safety precautions and instructions before using the equipment. Call 1-603-298-5711 or your local distributor if you have any questions.



GASES AND FUMES

Gases and fumes produced during the plasma cutting process can be dangerous and hazardous to your health.

- Keep all fumes and gases from the breathing area. Keep your head out of the welding fume plume.
- Use an air-supplied respirator if ventilation is not adequate to remove all fumes and gases.

- The kinds of fumes and gases from the plasma arc depend on the kind of metal being used, coatings on the metal, and the different processes. You must be very careful when cutting or welding any metals which may contain one or more of the following:

Antimony	Chromium	Mercury
Arsenic	Cobalt	Nickel
Barium	Copper	Selenium
Beryllium	Lead	Silver
Cadmium	Manganese	Vanadium

- Always read the Material Safety Data Sheets (MSDS) that should be supplied with the material you are using. These MSDS will give you the information regarding the kind and amount of fumes and gases that may be dangerous to your health.
- For information on how to test for fumes and gases in your workplace, refer to item 1 in Subsection 1.03, Publications in this manual.
- Use special equipment, such as water or down draft cutting tables, to capture fumes and gases.
- Do not use the plasma torch in an area where combustible or explosive gases or materials are located.
- Phosgene, a toxic gas, is generated from the vapors of chlorinated solvents and cleansers. Remove all sources of these vapors.
- This product, when used for welding or cutting, produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code Sec. 25249.5 et seq.)



ELECTRIC SHOCK

Electric Shock can injure or kill. The plasma arc process uses and produces high voltage electrical energy. This electric energy can cause severe or fatal shock to the operator or others in the workplace.

- Never touch any parts that are electrically "live" or "hot."
- Wear dry gloves and clothing. Insulate yourself from the work piece or other parts of the welding circuit.
- Repair or replace all worn or damaged parts.
- Extra care must be taken when the workplace is moist or damp.
- Install and maintain equipment according to NEC code, refer to item 9 in Subsection 1.03, Publications.
- Disconnect power source before performing any service or repairs.
- Read and follow all the instructions in the Operating Manual.



FIRE AND EXPLOSION

Fire and explosion can be caused by hot slag, sparks, or the plasma arc.

- Be sure there is no combustible or flammable material in the workplace. Any material that cannot be removed must be protected.
- Ventilate all flammable or explosive vapors from the workplace.

CUTMASTER 39

- Do not cut or weld on containers that may have held combustibles.
- Provide a fire watch when working in an area where fire hazards may exist.
- Hydrogen gas may be formed and trapped under aluminum workpieces when they are cut underwater or while using a water table. **DO NOT** cut aluminum alloys underwater or on a water table unless the hydrogen gas can be eliminated or dissipated. Trapped hydrogen gas that is ignited will cause an explosion.



NOISE

Noise can cause permanent hearing loss. Plasma arc processes can cause noise levels to exceed safe limits. You must protect your ears from loud noise to prevent permanent loss of hearing.

- To protect your hearing from loud noise, wear protective ear plugs and/or ear muffs. Protect others in the workplace.
- Noise levels should be measured to be sure the decibels (sound) do not exceed safe levels.
- For information on how to test for noise, see item 1 in Subsection 1.03, Publications, in this manual.



PLASMA ARC RAYS

Plasma Arc Rays can injure your eyes and burn your skin. The plasma arc process produces very bright ultra violet and infra red light. These arc rays will damage your eyes and burn your skin if you are not properly protected.

- To protect your eyes, always wear a welding helmet or shield. Also always wear safety glasses with side shields, goggles or other protective eye wear.
- Wear welding gloves and suitable clothing to protect your skin from the arc rays and sparks.
- Keep helmet and safety glasses in good condition. Replace lenses when cracked, chipped or dirty.
- Protect others in the work area from the arc rays. Use protective booths, screens or shields.
- Use the shade of lens as suggested in the following per ANSI/ASC Z49.1:

Arc Current	Minimum Protective Shade No.	Suggested Shade No.
Less Than 300*	8	9
300 - 400*	9	12
400 - 800*	10	14

* These values apply where the actual arc is clearly seen. Experience has shown that lighter filters may be used when the arc is hidden by the workpiece.



LEAD WARNING

This product contains chemicals, including lead, or otherwise produces chemicals known to the State of California to cause cancer, birth defects and other reproductive harm. **Wash hands after handling.** (California Health & Safety Code § 25249.5 et seq.)

1.03 Publications

Refer to the following standards or their latest revisions for more information:

1. OSHA, SAFETY AND HEALTH STANDARDS, 29CFR 1910, obtainable from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402
2. ANSI Standard Z49.1, SAFETY IN WELDING AND CUTTING, obtainable from the American Welding Society, 550 N.W. LeJeune Rd, Miami, FL 33126
3. NIOSH, SAFETY AND HEALTH IN ARC WELDING AND GAS WELDING AND CUTTING, obtainable from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402
4. ANSI Standard Z87.1, SAFE PRACTICES FOR OCCUPATION AND EDUCATIONAL EYE AND FACE PROTECTION, obtainable from American National Standards Institute, 1430 Broadway, New York, NY 10018
5. ANSI Standard Z41.1, STANDARD FOR MEN'S SAFETY-TOE FOOTWEAR, obtainable from the American National Standards Institute, 1430 Broadway, New York, NY 10018
6. ANSI Standard Z49.2, FIRE PREVENTION IN THE USE OF CUTTING AND WELDING PROCESSES, obtainable from American National Standards Institute, 1430 Broadway, New York, NY 10018
7. AWS Standard A6.0, WELDING AND CUTTING CONTAINERS WHICH HAVE HELD COMBUSTIBLES, obtainable from American Welding Society, 550 N.W. LeJeune Rd, Miami, FL 33126
8. NFPA Standard 51, OXYGEN-FUEL GAS SYSTEMS FOR WELDING, CUTTING AND ALLIED PROCESSES, obtainable from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269
9. NFPA Standard 70, NATIONAL ELECTRICAL CODE, obtainable from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269
10. NFPA Standard 51B, CUTTING AND WELDING PROCESSES, obtainable from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269
11. CGA Pamphlet P-1, SAFE HANDLING OF COMPRESSED GASES IN CYLINDERS, obtainable from the Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202
12. CSA Standard W117.2, CODE FOR SAFETY IN WELDING AND CUTTING, obtainable from the Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3
13. NWSA booklet, WELDING SAFETY BIBLIOGRAPHY obtainable from the National Welding Supply Association, 1900 Arch Street, Philadelphia, PA 19103
14. American Welding Society Standard AWSF4.1, RECOMMENDED SAFE PRACTICES FOR THE PREPARATION FOR WELDING AND CUTTING OF CONTAINERS AND PIPING THAT HAVE HELD HAZARDOUS SUBSTANCES, obtainable from the American Welding Society, 550 N.W. LeJeune Rd, Miami, FL 33126
15. ANSI Standard Z88.2, PRACTICE FOR RESPIRATORY PROTECTION, obtainable from American National Standards Institute, 1430 Broadway, New York, NY 10018

1.04 Note, Attention et Avertissement

Dans ce manuel, les mots "note," "attention," et "avertissement" sont utilisés pour mettre en relief des informations à caractère important. Ces mises en relief sont classifiées comme suit :

NOTE

Toute opération, procédure ou renseignement général sur lequel il importe d'insister davantage ou qui contribue à l'efficacité de fonctionnement du système.



ATTENTION

Toute procédure pouvant résulter l'endommagement du matériel en cas de non-respect de la procédure en question.



AVERTISSEMENT

Toute procédure pouvant provoquer des blessures de l'opérateur ou des autres personnes se trouvant dans la zone de travail en cas de non-respect de la procédure en question.

1.05 Precautions De Securite Importantes



AVERTISSEMENTS

L'OPÉRATION ET LA MAINTENANCE DU MATÉRIEL DE SOUDAGE À L'ARC AU JET DE PLASMA PEUVENT PRÉSENTER DES RISQUES ET DES DANGERS DE SANTÉ.

Couplant à l'arc au jet de plasma produit de l'énergie électrique haute tension et des émissions magnétique qui peuvent interférer la fonction propre d'un "pacemaker" cardiaque, les appareils auditif, ou autre matériel de santé électronique. Ceux qui travail près d'une application à l'arc au jet de plasma devrait consulter leur membre professionnel de médication et le manufacturier de matériel de santé pour déterminer s'il existe des risques de santé.

Il faut communiquer aux opérateurs et au personnel TOUS les dangers possibles. Afin d'éviter les blessures possibles, lisez, comprenez et suivez tous les avertissements, toutes les précautions de sécurité et toutes les consignes avant d'utiliser le matériel. Composez le + 603-298-5711 ou votre distributeur local si vous avez des questions.



FUMÉE et GAZ

La fumée et les gaz produits par le procédé de jet de plasma peuvent présenter des risques et des dangers de santé.

- Eloignez toute fumée et gaz de votre zone de respiration. Gardez votre tête hors de la plume de fumée provenant du chalumeau.
- Utilisez un appareil respiratoire à alimentation en air si l'aération fournie ne permet pas d'éliminer la fumée et les gaz.

- Les sortes de gaz et de fumée provenant de l'arc de plasma dépendent du genre de métal utilisé, des revêtements se trouvant sur le métal et des différents procédés. Vous devez prendre soin lorsque vous coupez ou soudez tout métal pouvant contenir un ou plusieurs des éléments suivants:

antimoine

argent

arsenic

baryum

béryllium

cadmium mercure

chrome

cobalt

cuivre

manganèse

nickel

plomb

sélénium

vanadium

- Lisez toujours les fiches de données sur la sécurité des matières (sigle américain "MSDS"); celles-ci devraient être fournies avec le matériel que vous utilisez. Les MSDS contiennent des renseignements quant à la quantité et la nature de la fumée et des gaz pouvant poser des dangers de santé.
- Pour des informations sur la manière de tester la fumée et les gaz de votre lieu de travail, consultez l'article 1 et les documents cités à la page 5.
- Utilisez un équipement spécial tel que des tables de coupe à débit d'eau ou à courant descendant pour capter la fumée et les gaz.
- N'utilisez pas le chalumeau au jet de plasma dans une zone où se trouvent des matières ou des gaz combustibles ou explosifs.
- Le phosgène, un gaz toxique, est généré par la fumée provenant des solvants et des produits de nettoyage chlorés. Eliminez toute source de telle fumée.
- Ce produit, dans le procédé de soudage et de coupe, produit de la fumée ou des gaz pouvant contenir des éléments reconnu dans L'état de la Californie, qui peuvent causer des défauts de naissance et le cancer. (La sécurité de santé en Californie et la code sécurité Sec. 25249.5 et seq.)



CHOC ELECTRIQUE

Les chocs électriques peuvent blesser ou même tuer. Le procédé au jet de plasma requiert et produit de l'énergie électrique haute tension. Cette énergie électrique peut produire des chocs graves, voire mortels, pour l'opérateur et les autres personnes sur le lieu de travail.

- Ne touchez jamais une pièce "sous tension" ou "vive"; portez des gants et des vêtements secs. Isolez-vous de la pièce de travail ou des autres parties du circuit de soudage.
- Réparez ou remplacez toute pièce usée ou endommagée.
- Prenez des soins particuliers lorsque la zone de travail est humide ou moite.
- Montez et maintenez le matériel conformément au Code électrique national des Etats-Unis. (Voir la page 5, article 9.)
- Débranchez l'alimentation électrique avant tout travail d'entretien ou de réparation.
- Lisez et respectez toutes les consignes du Manuel de consignes.



INCENDIE ET EXPLOSION

Les incendies et les explosions peuvent résulter des scories chaudes, des étincelles ou de l'arc de plasma. Le procédé à l'arc de plasma

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produit du métal, des étincelles, des scories chaudes pouvant mettre le feu aux matières combustibles ou provoquer l'explosion de fumées inflammables.

- Soyez certain qu'aucune matière combustible ou inflammable ne se trouve sur le lieu de travail. Protégez toute telle matière qu'il est impossible de retirer de la zone de travail.
- Procurez une bonne aération de toutes les fumées inflammables ou explosives.
- Ne coupez pas et ne soudez pas les conteneurs ayant pu renfermer des matières combustibles.
- Prévoyez une veille d'incendie lors de tout travail dans une zone présentant des dangers d'incendie.
- Le gaz hydrogène peut se former ou s'accumuler sous les pièces de travail en aluminium lorsqu'elles sont coupées sous l'eau ou sur une table d'eau. NE PAS couper les alliages en aluminium sous l'eau ou sur une table d'eau à moins que le gaz hydrogène peut s'échapper ou se dissiper. Le gaz hydrogène accumulé explosera si enflammé.



BRUIT

Le bruit peut provoquer une perte permanente de l'ouïe. Les procédés de soudage à l'arc de plasma peuvent provoquer des niveaux sonores supérieurs aux limites normalement acceptables. Vous devez vous protéger les oreilles contre les bruits forts afin d'éviter une perte permanente de l'ouïe.

- Pour protéger votre ouïe contre les bruits forts, portez des tampons protecteurs et/ou des protections auriculaires. Protégez également les autres personnes se trouvant sur le lieu de travail.
- Il faut mesurer les niveaux sonores afin d'assurer que les décibels (le bruit) ne dépassent pas les niveaux sûrs.
- Pour des renseignements sur la manière de tester le bruit, consultez l'article 1, page 5.



PLOMB AVERTISSEMENT

Ce produit contient des produits chimiques, comme le plomb, ou engendre des produits chimiques, reconnus par l'état de Californie comme pouvant être à l'origine de cancer, de malformations fœtales ou d'autres problèmes de reproduction. **Il faut se laver les mains après toute manipulation.** (Code de Californie de la sécurité et santé, paragraphe 25249.5 et suivants)



RAYONS D'ARC DE PLASMA

Les rayons provenant de l'arc de plasma peuvent blesser vos yeux et brûler votre peau. Le procédé à l'arc de plasma produit une lumière infra-rouge et des rayons ultra-violets très forts. Ces rayons d'arc nuiront à vos yeux et brûleront votre peau si vous ne vous protégez pas correctement.

- Pour protéger vos yeux, portez toujours un casque ou un écran de soudeur. Portez toujours des lunettes de sécurité munies de parois latérales ou des lunettes de protection ou une autre sorte de protection oculaire.
- Portez des gants de soudeur et un vêtement protecteur approprié pour protéger votre peau contre les étincelles et les rayons de l'arc.
- Maintenez votre casque et vos lunettes de protection en bon état. Remplacez toute lentille sale ou comportant fissure ou rognure.
- Protégez les autres personnes se trouvant sur la zone de travail contre les rayons de l'arc en fournissant des cabines ou des écrans de protection.
- Utilisez la nuance de lentille qui est suggérée dans le recommandation qui suivent ANSI/ASC Z49.1:

Courant Arc	Nuance Minimum Protective Numéro	Nuance Suggérée Numéro
Moins de 300*	8	9
300 - 400*	9	12
400 - 800*	10	14

* Ces valeurs s'appliquent ou l'arc actuel est observé clairement. L'expérience a démontrer que les filtres moins foncés peuvent être utilisés quand l'arc est caché par moiceau de travail.

1.06 Documents De Reference

Consultez les normes suivantes ou les révisions les plus récentes ayant été faites à celles-ci pour de plus amples renseignements :

1. OSHA, NORMES DE SÉCURITÉ DU TRAVAIL ET DE PROTECTION DE LA SANTÉ, 29CFR 1910, disponible auprès du Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402
2. Norme ANSI Z49.1, LA SÉCURITÉ DES OPÉRATIONS DE COUPE ET DE SOUDAGE, disponible auprès de la Société Américaine de Soudage (American Welding Society), 550 N.W. LeJeune Rd., Miami, FL 33126
3. NIOSH, LA SÉCURITÉ ET LA SANTÉ LORS DES OPÉRATIONS DE COUPE ET DE SOUDAGE À L'ARC ET AU GAZ, disponible auprès du Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402
4. Norme ANSI Z87.1, PRATIQUES SURES POUR LA PROTECTION DES YEUX ET DU VISAGE AU TRAVAIL ET DANS LES ECOLES, disponible de l'Institut Américain des Normes Nationales (American National Standards Institute), 1430 Broadway, New York, NY 10018
5. Norme ANSI Z41.1, NORMES POUR LES CHAUSSURES PROTECTRICES, disponible auprès de l'American National Standards Institute, 1430 Broadway, New York, NY 10018
6. Norme ANSI Z49.2, PRÉVENTION DES INCENDIES LORS DE L'EMPLOI DE PROCÉDÉS DE COUPE ET DE SOUDAGE, disponible auprès de l'American National Standards Institute, 1430 Broadway, New York, NY 10018
7. Norme A6.0 de l'Association Américaine du Soudage (AWS), LE SOUDAGE ET LA COUPE DE CONTENEURS AYANT RENFERMÉ DES PRODUITS COMBUSTIBLES, disponible auprès de la American Welding Society, 550 N.W. LeJeune Rd., Miami, FL 33126
8. Norme 51 de l'Association Américaine pour la Protection contre les Incendies (NFPA), LES SYSTEMES À GAZ AVEC ALIMENTATION EN OXYGÈNE POUR LE SOUDAGE, LA COUPE ET LES PROCÉDÉS ASSOCIÉS, disponible auprès de la National Fire Protection Association, Batterymarch Park, Quincy, MA 02269
9. Norme 70 de la NFPA, CODE ELECTRIQUE NATIONAL, disponible auprès de la National Fire Protection Association, Batterymarch Park, Quincy, MA 02269
10. Norme 51B de la NFPA, LES PROCÉDÉS DE COUPE ET DE SOUDAGE, disponible auprès de la National Fire Protection Association, Batterymarch Park, Quincy, MA 02269
11. Brochure GCA P-1, LA MANIPULATION SANS RISQUE DES GAZ COMPRIMÉS EN CYLINDRES, disponible auprès de l'Association des Gaz Comprimés (Compressed Gas Association), 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202
12. Norme CSA W117.2, CODE DE SÉCURITÉ POUR LE SOUDAGE ET LA COUPE, disponible auprès de l'Association des Normes Canadiennes, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada, M9W 1R3
13. Livret NWSA, BIBLIOGRAPHIE SUR LA SÉCURITÉ DU SOUDAGE, disponible auprès de l'Association Nationale de Fournitures de Soudage (National Welding Supply Association), 1900 Arch Street, Philadelphia, PA 19103
14. Norme AWSF4.1 de l'Association Américaine de Soudage, RECOMMANDATIONS DE PRATIQUES SURES POUR LA PRÉPARATION À LA COUPE ET AU SOUDAGE DE CONTENEURS ET TUYAUX AYANT RENFERMÉ DES PRODUITS DANGEREUX, disponible auprès de la American Welding Society, 550 N.W. LeJeune Rd., Miami, FL 33126
15. Norme ANSI Z88.2, PRATIQUES DE PROTECTION RESPIRATOIRE, disponible auprès de l'American National Standards Institute, 1430 Broadway, New York, NY 10018

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1.07 Declaration of Conformity

Manufacturer: Thermal Dynamics Corporation
Address: 82 Benning Street
West Lebanon, New Hampshire 03784
USA

age Directive' (European Council Directive 73/23/EEC as amended by Council Directive 93/68/EEC) and to the National legislation for the enforcement of this Directive.

The equipment described in this manual conforms to all applicable aspects and regulations of the "EMC Directive" (European Council Directive 89/336/EEC) and to the National legislation for the enforcement of this Directive.

Serial numbers are unique with each individual piece of equipment and details description, parts used to manufacture a unit and date of manufacture.

National Standard and Technical Specifications

The product is designed and manufactured to a number of standards and technical requirements. Among them are:

- * UL (Underwriters Laboratory) rating 94VO flammability testing for all printed-circuit boards used.
- * For environments with increased hazard of electrical shock, Power Supplies bearing the  mark conform to EN50192 when used in conjunction with hand torches with exposed cutting tips, if equipped with properly installed standoff guides.
- * Extensive product design verification is conducted at the manufacturing facility as part of the routine design and manufacturing process. This is to ensure the product is safe, when used according to instructions in this manual and related industry standards, and performs as specified. Rigorous testing is incorporated into the manufacturing process to ensure the manufactured product meets or exceeds all design specifications.

Thermal Dynamics has been manufacturing products for more than 30 years, and will continue to achieve excellence in our area of manufacture.

Manufacturers responsible representative: Steve Ward
Operations Director
Thermadyne Europe
Europa Building
Chorley N Industrial Park
Chorley, Lancashire,
England PR6 7BX

1.08 Statement of Warranty

LIMITED WARRANTY: Subject to the terms and conditions established below, Thermal Dynamics® Corporation warrants to the original retail purchaser that new Thermal Dynamics CUTMASTER™ plasma cutting systems sold after the effective date of this warranty are free of defects in material and workmanship. Should any failure to conform to this warranty appear within the applicable period stated below, Thermal Dynamics Corporation shall, upon notification thereof and substantiation that the product has been stored operated and maintained in accordance with Thermal Dynamics' specifications, instructions, recommendations and recognized industry practice, correct such defects by suitable repair or replacement.

This warranty is exclusive and in lieu of any warranty of merchantability or fitness for a particular purpose.

Thermal Dynamics will repair or replace, at its discretion, any warranted parts or components that fail due to defects in material or workmanship within the time periods set out below. Thermal Dynamics Corporation must be notified within 30 days of any failure, at which time Thermal Dynamics Corporation will provide instructions on the warranty procedures to be implemented.

Thermal Dynamics Corporation will honor warranty claims submitted within the warranty periods listed below. All warranty periods begin on the date of sale of the product to the original retail customer or 1 year after sale to an authorized Thermal Dynamics Distributor.

LIMITED WARRANTY PERIOD

Product	Power Supply Components (Parts and Labor)	Torch and Leads (Parts and Labor)
CUTMASTER™ 39	4 Years	1 Year
CUTMASTER™ 52	4 Years	1 Year
CUTMASTER™ 82	4 Years	1 Year
CUTMASTER™ 102	4 Years	1 Year
CUTMASTER™ 152	4 Years	1 Year

This warranty does not apply to:

1. Consumable Parts, such as tips, electrodes, shield cups, o - rings, starter cartridges, gas distributors, fuses, filters.
2. Equipment that has been modified by an unauthorized party, improperly installed, improperly operated or misused based upon industry standards.

In the event of a claim under this warranty, the remedies shall be, at the discretion of Thermal Dynamics Corporation:

1. Repair of the defective product.
2. Replacement of the defective product.
3. Reimbursement of reasonable costs of repair when authorized in advance by Thermal Dynamics.
4. Payment of credit up to the purchase price less reasonable depreciation based on actual use.

These remedies may be authorized by Thermal Dynamics and are FOB West Lebanon, NH or an authorized Thermadyne service station. Product returned for service is at the owner's expense and no reimbursement of travel or transportation is authorized.

LIMITATION OF LIABILITY: Thermal Dynamics Corporation shall not under any circumstances be liable for special or consequential damages such as, but not limited to, damage or loss of purchased or replacement goods or claims of customer or distributors (hereinafter "Purchaser") for service interruption. The remedies of the Purchaser set forth herein are exclusive and the liability of Thermal Dynamics with respect to any contract, or anything done in connection therewith such as the performance or breach thereof, or from the manufacture, sale, delivery, resale, or use of the goods covered by or furnished by Thermal Dynamics whether arising out of contract, negligence, strict tort, or under any warranty, or otherwise, shall not, except as expressly provided herein, exceed the price of the goods upon which liability is based.

This warranty becomes invalid if replacement parts or accessories are used which may impair the safety or performance of any Thermal Dynamics product.

This warranty is invalid if the Thermal Dynamics product is sold by non - authorized persons.

Effective September 4, 2007

SECTION 2 SYSTEM: INTRODUCTION

2.01 How To Use This Manual

This Operating Manual applies to just specification or part numbers listed on page i. To ensure safe operation, read the entire manual, including the chapter on safety instructions and warnings.

Throughout this manual, the words **WARNING**, **CAUTION**, and **NOTE** may appear. Pay particular attention to the information provided under these headings. These special annotations are easily recognized as follows:



WARNING

A WARNING gives information regarding possible personal injury.



CAUTION

A CAUTION refers to possible equipment damage.

NOTE

A NOTE offers helpful information concerning certain operating procedures.

Additional copies of this manual may be purchased by contacting Thermal Dynamics at the address and phone number in your area listed in the inside back cover of this manual. Include the Operating Manual number and equipment identification numbers.

Electronic copies of this manual can also be downloaded at no charge in Acrobat PDF format by going to the

Thermal Dynamics web site listed below and clicking on Thermal Dynamics and then on the Literature link:

<http://www.thermal-dynamics.com>

2.02 Equipment Identification

The unit's identification number (specification or part number), model, and serial number usually appear on a data tag attached to the rear panel. Equipment which does not have a data tag such as torch and cable assemblies are identified only by the specification or part number printed on loosely attached card or the shipping container. Record these numbers on the bottom of page 1 for future reference.

2.03 Receipt Of Equipment

When you receive the equipment, check it against the invoice to make sure it is complete and inspect the equipment for possible damage due to shipping. If there is any damage, notify the carrier immediately to file a claim. Furnish complete information concerning damage claims or shipping errors to the location in your area listed in the inside back cover of this manual.

Include all equipment identification numbers as described above along with a full description of the parts in error.

Move the equipment to the installation site before un-crating the unit. Use care to avoid damaging the equipment when using bars, hammers, etc., to un-crater the unit.

2.04 Power Supply Specifications

CutMaster 39 Power Supply Specifications	
Input Power (See Note 1)	120 VAC ($\pm 10\%$), Single-Phase, 50/60 Hz
	208 - 230 VAC ($\pm 10\%$), Single-Phase, 50/60 Hz
Power Sensing	Automatic Voltage Selection. See Note 1.
Input Power Cable	Cable with NEMA L6-20P plug, for use with one of two adapters provided, 120V/15A with NEMA 5-15P plug or 240V/20A with NEMA 6-50P plug
Output Current	20-30 Amps, continuously variable
Power Supply Gas Filtering Ability	Particulates to 20 Microns

CutMaster 39 Power Supply Duty Cycle (Note 2)

Ambient Temperature	104° F (40° C)	
Duty Cycle	35%	60%
DC Voltage	78 vdc	89 vdc
Current	30 Amps	22 Amps

SL 60 Torch Gas Requirements

Gas Type	Compressed Air
Gas specifications	Clean, dry, oil-free (Note 3)
Maximum Input Gas Pressure	125 psi / 8.6 bar
Operating Gas Pressure	65 psi / 4.5 bar
Gas Flow Requirements	300 scfh / 141.5 lpm

Notes

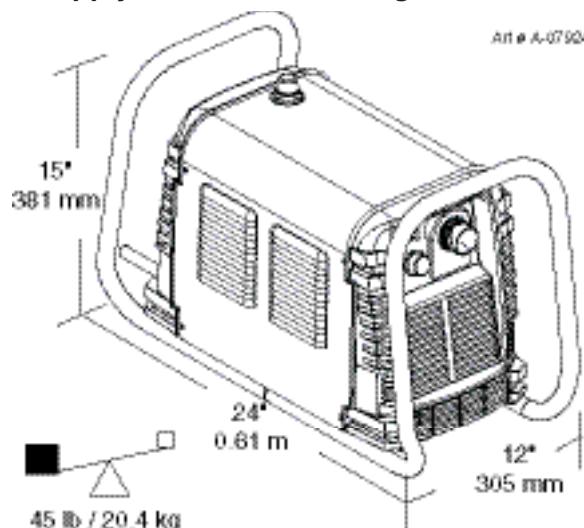
1. Power supply accepts 120-230 VAC input power. No manual switching is required.
2. Duty Cycle is the percentage of time the system can be operated without overheating. Duty cycle is reduced if primary input voltage (AC) is low or the DC voltage is higher than shown in this chart.
3. Air supply must be free of oil, moisture, and other contaminants. Excessive oil and moisture may cause double-arching, rapid tip wear, or even complete torch failure. Contaminants may cause poor cutting performance and rapid electrode wear. Optional filters provide increased filtering capabilities.

NOTE

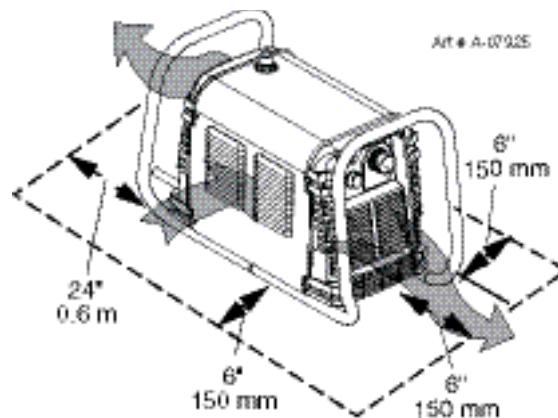
IEC Rating is determined as specified by the International Electro-Technical Commission. These specifications include calculating an output voltage based upon power supply rated current. To facilitate comparison between power supplies, all manufacturers use this output voltage to determine duty cycle.

TDC Rating is determined using an output voltage representative of actual output voltage during cutting with a TDC torch. This voltage may be more or less than IEC voltage, depending upon choice of torch, consumables, and actual cutting operation.

Power Supply Dimensions & Weight



Ventilation Clearance Requirements



NOTE

Weight includes torch & leads, input power cord, and work cable with clamp.



Provide clearance for proper air flow through the power supply. Operation without proper air flow will inhibit proper cooling and reduce duty cycle.

2.05 Input Wiring Specifications

CutMaster 39 Input Power Requirements						
Input		Power Input	Current Input	Suggested Sizes (See Notes)		
Voltage	Freq.	(kVA)	(Amps)	Fuse (Amps)	Wire (AWG)	Wire (Canada)
(Volts)	(Hz)	1-Ph	1-Ph	1-Ph	1-Ph	1-Ph
120	50 / 60	3.6	29	35	12	12
208	50 / 60	3.5	16	20	12	12
230	50 / 60	3.4	14	20	12	12

Line Voltages with Suggested Circuit Protection and Wire Sizes
Based on National Electric Code and Canadian Electric Code

NOTES

Refer to Local and National Codes or local authority having jurisdiction for proper wiring requirements.
Refer to Local and National Codes or local authority having jurisdiction for proper wiring requirements.

Cable size is de-rated based on the Duty Cycle of the equipment.

The suggested sizes are based on flexible power cable with power plug installations.

Cable conductor temperature used is 167° F (75° C).

An energy limiting fuse UL Class RK-1 (examples: BUSS LPS/LPN-RK or Gould-Shawmut AZK-A6K) should be used to minimize damage to Plasma Cutting, Welding or power distribution equipment.

NEVER use replaceable element fuses like UL Class H, or "one-time" fuses like UL Class K5.

Extension Cords

Extension cords must meet National Electric Code Guidelines (and OSHA Guidelines, where applicable). Extension cords must have the same rating as the service and must have a three-pronged plug.

2.06 Power Supply Options and Accessories

The following options and accessories are available for this Power Supply. Section 6 provides catalog numbers and ordering information.

A. Single-Stage Air Filter Kit

A single-stage air filter for use on compressed air shop systems. Highly effective at removing moisture and particulate matter from the air stream to at least 0.85 microns.

B. Multi-Purpose Cart

Rugged steel cart on easy-rolling rear wheels and front-mounted swivel casters. Provides maximum mobility for the power supply and can also serve as a display cart. Top shelf is 12" (305 mm) x 20 (508 mm). Steel handle is 30" (762 mm) high.

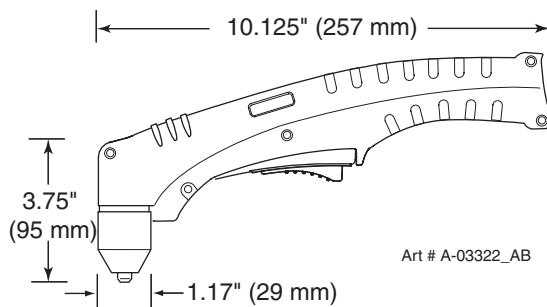
C. Cutting Guide Kit

Easy add-on attachments for straight line, circle, or bevel cutting.

2.07 Torch Specifications

A. Torch Configuration and Dimensions

The torch head is at 75° to the torch handle. The torch includes a torch handle and torch trigger assembly.



Torch Configuration and Dimensions

B. Torch Leads Lengths

Leads are available in 20 ft (6.1 m) lengths.

C. Parts-In-Place (PIP)

Torch has built-in switch.

12 vdc circuit rating

D. Type of Cooling

Combination of ambient air and gas stream through torch

E. SL60 Torch Ratings (Refer to Note)

NOTE

Ratings shown apply to the SL60 Torch only. Refer to the Specifications chart on page 2T-1 for CutMaster 39 data.

F. Plasma Power Supply Used With

- Thermal Dynamics CutMaster 39

SECTION 2 TORCH: INTRODUCTION

2T.01 Scope of Manual

This manual contains descriptions, operating instructions and maintenance procedures for the 1Torch Model SL60 Plasma Cutting Torch. Service of this equipment is restricted to properly trained personnel; unqualified personnel are strictly cautioned against attempting repairs or adjustments not covered in this manual, at the risk of voiding the Warranty.

Read this manual thoroughly. A complete understanding of the characteristics and capabilities of this equipment will assure the dependable operation for which it was designed.

2T.02 General Description

Plasma torches are similar in design to the automotive spark plug. They consist of negative and positive sections separated by a center insulator. Inside the torch, the pilot arc starts in the gap between the negatively charged electrode and the positively charged tip. Once the pilot arc has ionized the plasma gas, the superheated column of gas flows through the small orifice in the torch tip, which is focused on the metal to be cut.

A single torch lead provides gas from a single source to be used as both the plasma and secondary gas. The air flow is divided inside the torch head. Single - gas operation provides a smaller sized torch and inexpensive operation.

NOTE

Refer to Section 2T.05, *Introduction To Plasma*, for a more detailed description of plasma torch operation.

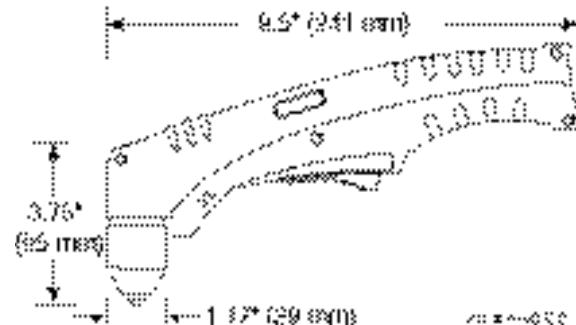
Refer to the Appendix Pages for additional specifications as related to the Power Supply used.

2T.03 Specifications

A. Torch Configurations

1. Hand Torch, Model SL60

The hand torch head is at 75° to the torch handle. The hand torches include a torch handle and torch trigger assembly.



B. Torch Leads Lengths

Hand Torches are available as follows:

- 20 ft / 6.1 m.

C. Torch Parts

Starter Cartridge, Electrode, Tip, Shield Cup

D. Parts - In - Place (PIP)

Torch Head has built - in switch

12 vdc circuit rating

E. Type Cooling

Combination of ambient air and gas stream through torch.

F. Torch Ratings

SL60 Torch Ratings	
Ambient Temperature	104° F 40° C
Duty Cycle	100% @ 60 Amps @ 400 scfh
Maximum Current	60 Amps
Voltage (V_{peak})	500V
Arc Striking Voltage	7kV

G. Current Ratings

SL60 Current Ratings	
SL60 Torch & Leads	Up to 60 Amps, DC, Straight Polarity

NOTE

Power Supply characteristics will determine material thickness range.

H. Gas Requirements

SL60 Torch Gas Specifications	
Gas (Plasma and Secondary)	Compressed Air
Operating Pressure Refer to NOTE	60 - 75 psi 4.1 - 5.2 bar
Maximum Input Pressure	125 psi / 8.6 bar
Gas Flow (Cutting and Gouging)	300 - 500 scfh 142 - 235 lpm

**WARNING**

This torch is not to be used with oxygen (O₂).

NOTE

Operating pressure varies with torch model, operating amperage, and torch leads length. Refer to gas pressure settings charts for each model.

I. Direct Contact Hazard

For exposed tip the recommended standoff is 3/16 inches / 4.7 mm.

2T.04 Options And Accessories

These items can adapt a standard system to a particular application or further enhance performance.

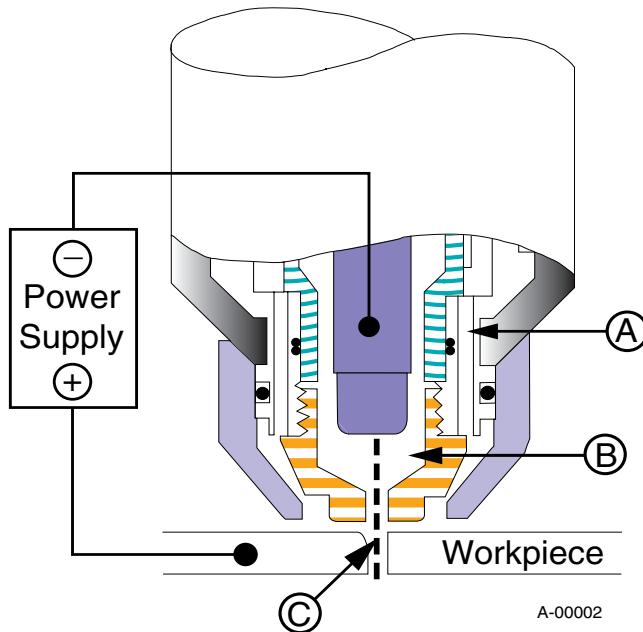
- Deluxe Cutting Guide Kit - Easy add - on attachments for precise straight line, circle cutting, and beveling. Includes carrying case.
- Trigger Guard Kits - These offer additional protection from accidental activation of the torch switch.
- Leads Extensions for torches with ATC connectors
- Leather Leads Covers

2T.05 Introduction to Plasma**A. Plasma Gas Flow**

Plasma is a gas which has been heated to an extremely high temperature and ionized so that it becomes electrically conductive. The plasma arc cutting and gouging processes use this plasma to transfer an electrical arc to the workpiece. The metal to be cut or removed is melted by the heat of the arc and then blown away.

While the goal of plasma arc cutting is separation of the material, plasma arc gouging is used to remove metals to a controlled depth and width.

In a Plasma Cutting Torch a cool gas enters Zone B, where a pilot arc between the electrode and the torch tip heats and ionizes the gas. The main cutting arc then transfers to the workpiece through the column of plasma gas in Zone C.



Typical Torch Head Detail

By forcing the plasma gas and electric arc through a small orifice, the torch delivers a high concentration of heat to a small area. The stiff, constricted plasma arc is shown in Zone C. Direct current (DC) straight polarity is used for plasma cutting, as shown in the illustration.

Zone A channels a secondary gas that cools the torch. This gas also assists the high velocity plasma gas in blowing the molten metal out of the cut allowing for a fast, slag - free cut.

B. Gas Distribution

The single gas used is internally split into plasma and secondary gases.

The plasma gas flows into the torch through the negative lead, through the starter cartridge, around the electrode, and out through the tip orifice.

The secondary gas flows down around the outside of the torch starter cartridge, and out between the tip and shield cup around the plasma arc.

C. Pilot Arc

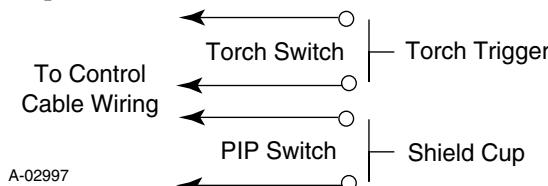
When the torch is started a pilot arc is established between the electrode and cutting tip. This pilot arc creates a path for the main arc to transfer to the work.

D. Main Cutting Arc

DC power is also used for the main cutting arc. The negative output is connected to the torch electrode through the torch lead. The positive output is connected to the workpiece via the work cable and to the torch through a pilot wire.

E. Parts - In - Place (PIP)

The torch includes a 'Parts - In - Place' (PIP) circuit. When the shield cup is properly installed, it closes a switch. The torch will not operate if this switch is open.



Parts - In - Place Circuit Diagram for Hand Torch

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SECTION 3: INSTALLATION

3.01 Unpacking

1. Use the packing lists to identify and account for each item.
2. Inspect each item for possible shipping damage. If damage is evident, contact your distributor and / or shipping company before proceeding with the installation.
3. Record Power Supply and Torch model and serial numbers, purchase date and vendor name, in the information block at the front of this manual.

3.02 Lifting Options

The Power Supply includes a handle for **hand lifting only**. Be sure unit is lifted and transported safely and securely.



Do not touch live electrical parts.

Disconnect input power cord before moving unit.

FALLING EQUIPMENT can cause serious personal injury and can damage equipment.

HANDLE is not for mechanical lifting.

- Only persons of adequate physical strength should lift the unit.
- Lift unit by the handle, using two hands. Do not use straps for lifting.
- Use optional cart or similar device of adequate capacity to move unit.
- Place unit on a proper skid and secure in place before transporting with a fork lift or other vehicle.

3.03 Primary Input Power Connections

**CAUTION**

Check your power source for correct voltage before plugging in or connecting the unit. The primary power source, fuse, and any extension cords used must conform to local electrical code and the recommended circuit protection and wiring requirements as specified in Section 2.

Power Cords Included With Power Supply

Attached to the power supply is an input power cord with a twist-lock plug NEMA L6-20P for use on a 240V/20A system.

Also included are two addapter cords. One has a 120V/15A NEMA 5-15P plug for use with current settings up to 20 Amps. (Higher settings may result in tripping of 15 Amp circuit breaker).

The other adapter cord is equipped with a 240V/20A NEMA 6-50P plug. Each of these adapter cords attaches to the power supply input cord via the twist-lock connection.



Input Power Cord With NEMA L6-20P



Adapter for 120V/15A With NEMA 5-15P



Adapter for 240V/20A With NEMA 6-50P

**CAUTION**

When using the 120V/15A adapter cord, do not exceed a current output setting of 20Amps on the power supply or the input power circuit breaker may trip.

Input Voltage	Rated Output	Amps (RMS) input at rated output, 60 Hz, single-phase	kVA
120V, 15A Circuit	20A, 88V	18	2.2
120V, 20A Circuit	28A, 90V	26	3.1
120V, 30A Circuit	30A, 92V	29	3.5
208-230V, 20A Circuit	30A, 92V	16-14	3.3

3.04 Gas Connections

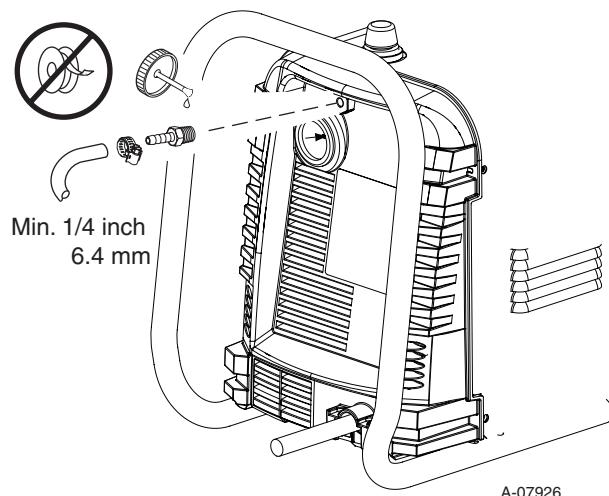
A. Connecting Gas Supply to Unit

The connection is the same for compressed air or high pressure gas cylinders. Refer to subsection 3.4-C if an optional air line filter is to be installed.

1. Connect the gas line to the inlet port. The illustration shows typical fittings as an example.

NOTE

For a secure seal, apply thread sealant to the fitting threads, according to manufacturer's instructions. Do Not use Teflon tape as a thread sealer, as small particles of the tape may break off and block the small gas passages in the torch.

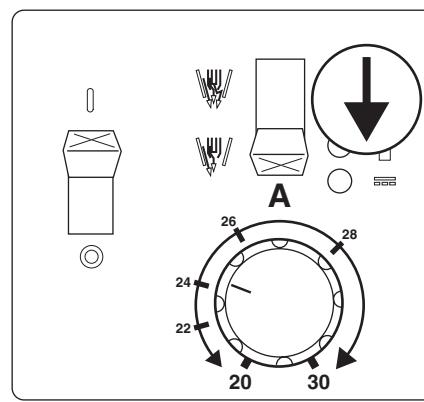


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Gas Connection to Inlet Port

B. Check Air Quality

To test the quality of air, put the RUN / SET switch in the SET (down) position, place a welding filter lens in front of the torch and turn on the gas. Any oil or moisture in the air will be visible on the lens. **Do not start an arc!**



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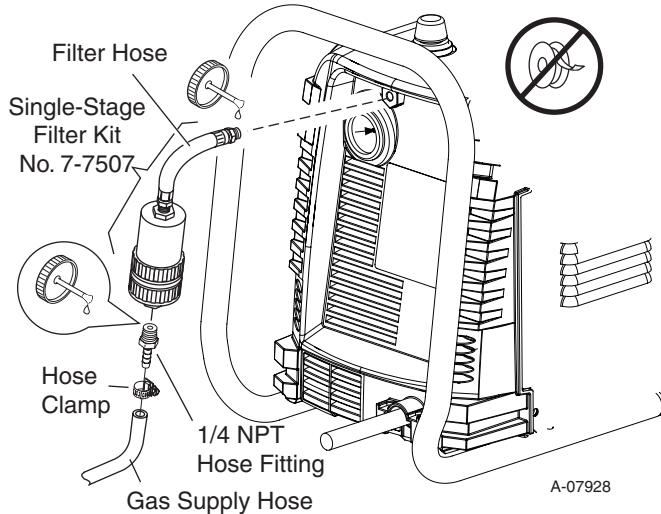
C. Installing Optional Single - Stage Air Filter

An optional filter kit is recommended for improved filtering with compressed air, to keep moisture and debris out of the torch.

1. Attach the Single - Stage Filter Hose to the Inlet Port.
2. Attach the Filter Assembly to the filter hose.
3. Connect the gas line to the Filter. The illustration shows typical fittings as an example.

NOTE

For a secure seal, apply thread sealant to the fitting threads, according to the maker's instructions. Do Not use Teflon tape as a thread sealer, as small particles of the tape may break off and block the small gas passages in the torch. Connect as follows:



Optional Single - Stage Filter Installation

D. Using High Pressure Gas Cylinders

When using high pressure gas cylinders as the gas supply:

1. Refer to the manufacturer's specifications for installation and maintenance procedures for high pressure gas regulators.
2. Examine the cylinder valves to be sure they are clean and free of oil, grease or any foreign material. Briefly open each cylinder valve to blow out any dust which may be present.
3. The cylinder must be equipped with an adjustable high - pressure regulator capable of outlet pressures up to 100 psi (6.9 bar) maximum and flows of at least 300 scfh (141.5 lpm).
4. Connect gas supply hose to the cylinder.

NOTE

Pressure should be set at 100 psi (6.9 bar) at the high pressure gas cylinder regulator.

Supply hose must be at least 1/4 inch (6 mm) I.D.

For a secure seal, apply thread sealant to the fitting threads, according to manufacturer's instructions. Do Not use Teflon tape as a thread sealer, as small particles of the tape may break off and block the small gas passages in the torch.

3.05 Torch Connections

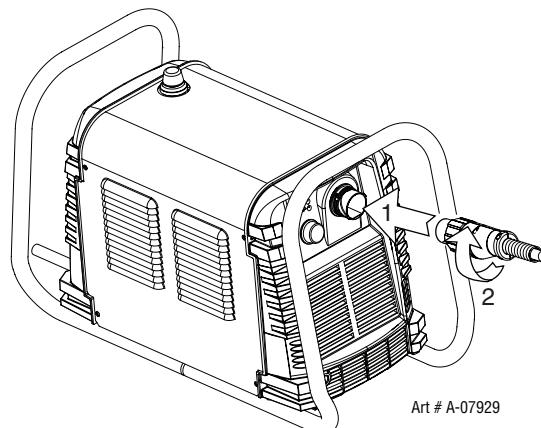
If necessary, connect the torch to the Power Supply. Connect only the Thermal Dynamics model SL60 Torch to this power supply.



WARNING

Disconnect primary power at the source before connecting the torch.

1. Align the male connector (on the torch lead) with the female receptacle on the power supply. Press the connector into the receptacle fully.
2. Turn the locking ring on the male connector fully clockwise until it clicks.



Connecting the Torch to the Power Supply

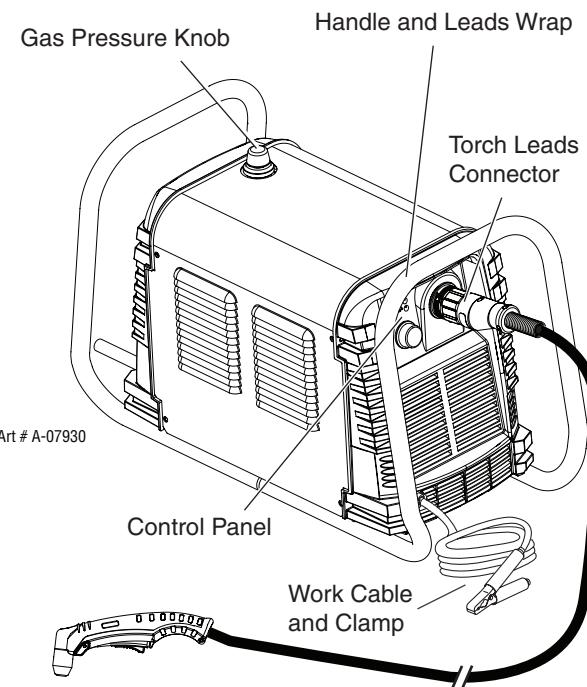
3. The system is ready for operation.

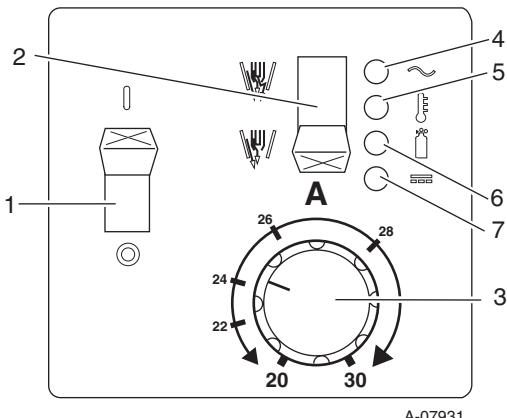
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SECTION 4 SYSTEM: OPERATION

4.01 Product Features

A. General Features



B. Control Panel**1. ON / OFF Switch**

Controls input power to the power supply. Up is ON, down is OFF.

2. RUN / SET Switch

RUN (up) position is for general torch operation. SET (down) position is for setting gas pressure and purging lines.

3. (A) Output Current Control

Sets the desired output current. If the overload protection (fuse or circuit breaker) on the input power circuit opens frequently, either reduce cutting output, reduce the cutting time, or connect the unit to more adequate input power. Refer to Section 2 for input power requirements.

4. \sim AC Indicator

Steady light indicates power supply is ready for operation. Blinking light indicates unit is in protective interlock mode. Shut unit off, shut off or disconnect input power, correct the fault, and restart the unit. Refer to Section 5 for details.

**5. --- TEMP Indicator**

Indicator is normally OFF. Indicator is ON when internal temperature exceeds normal limits. Allow the unit to run with the fan on until the Temp indicator turns off.

**6. GAS Indicator**

Indicator is ON when adequate input gas pressure is present to operate the power supply.

7. --- DC Indicator

Indicator is ON when DC output circuit is active.

4.02 Preparations For Operating

At the start of each operating session:



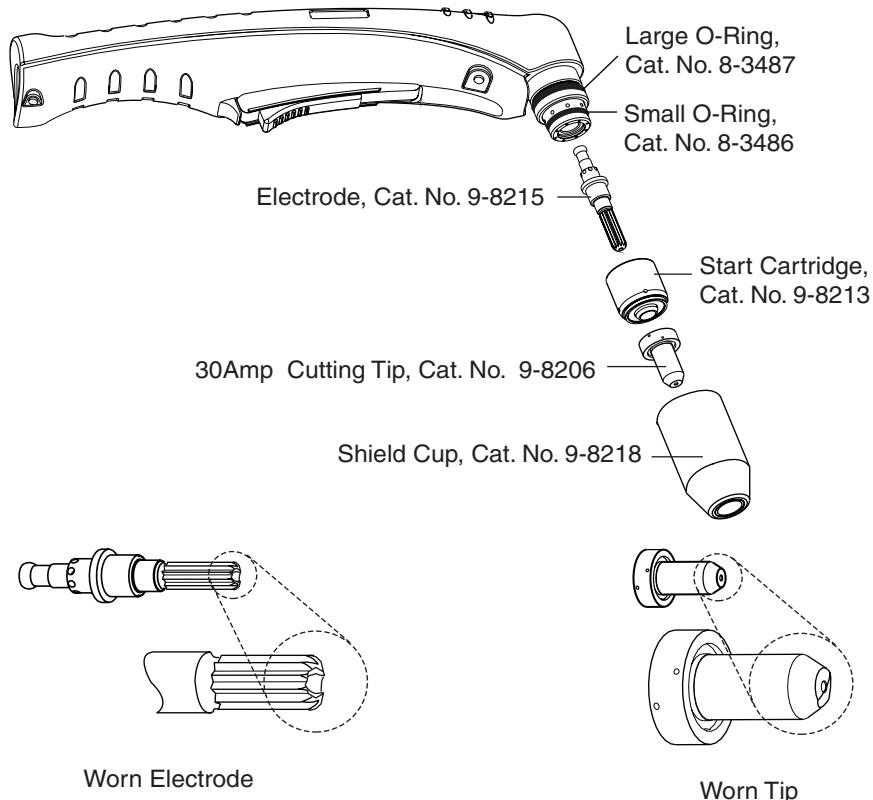
WARNING

Disconnect primary power at the source before assembling or disassembling power supply, torch parts, or torch and leads assemblies.

A. Torch Parts Selection

Check the torch for proper assembly and appropriate torch parts. The torch parts must correspond with the type of operation, and with the amperage output of this Power Supply (30 amps maximum). Use only genuine Thermal Dynamics parts with this torch.

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NOTE

When operating the torch in a normal condition, a small amount of gas vents through the gap between the shield cup and torch handle. Do not attempt to over tighten the shield cup as irreparable damage to internal components may result.

B. Torch Connection

Check that the torch is properly connected.

C. Check Primary Input Power Source

1. Check the power source for proper input voltage. Make sure the input power source meets the power requirements for the unit per Section 2, Specifications.
2. Connect the input power cable (or close the main disconnect switch) to supply power to the system.

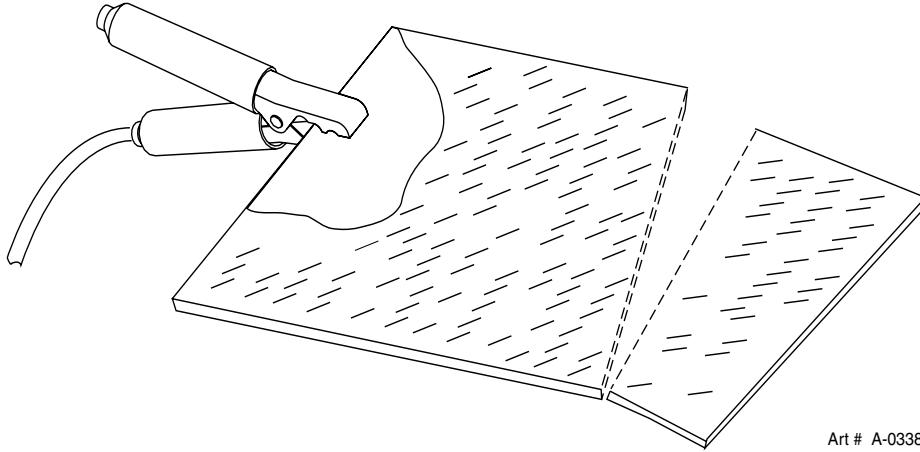
CUTMASTER 39

D. Gas Selection

Ensure gas source meets requirements (refer to Section 2). Check connections and turn gas supply on.

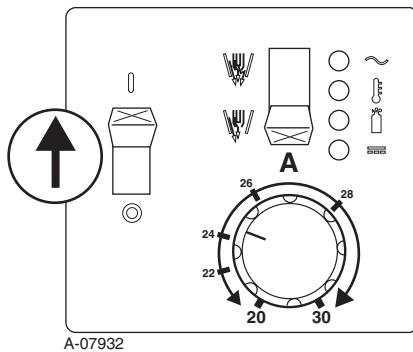
E. Connect Work Cable

Clamp the work cable to the workpiece or cutting table. The area must be free from oil, paint and rust. Connect only to the main part of the workpiece; do not connect to the part to be cut off.



F. Power On

Place the Power Supply ON / OFF switch to the ON (up) position. AC indicator \sim turns on.

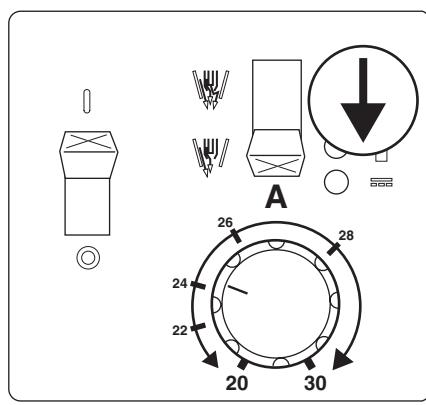


G. Set Operating Pressure

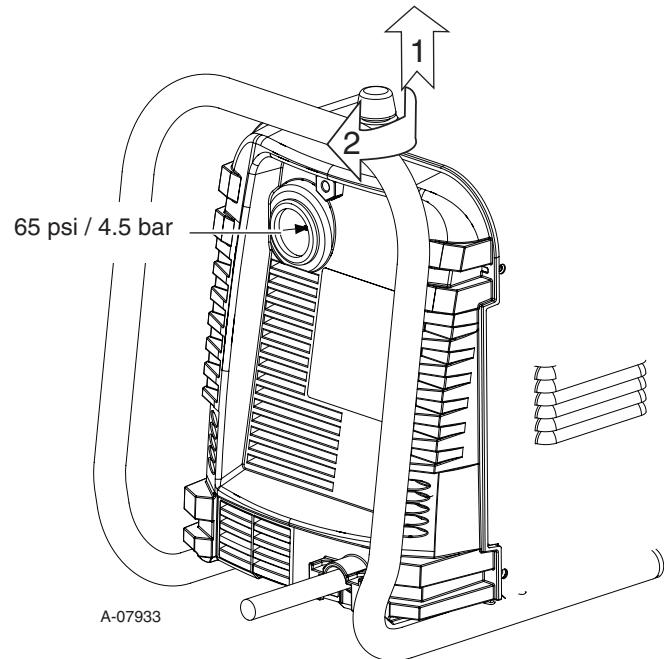
Place the Power Supply RUN / SET switch to the SET (down) position. Gas will flow. Adjust gas pressure to 65 psi / 4.5 bar. Gas indicator  turns on.

NOTE

If gas regulator leaks, reset gas pressure to 0 psi, then reset to 65 psi / 4.5 bar.

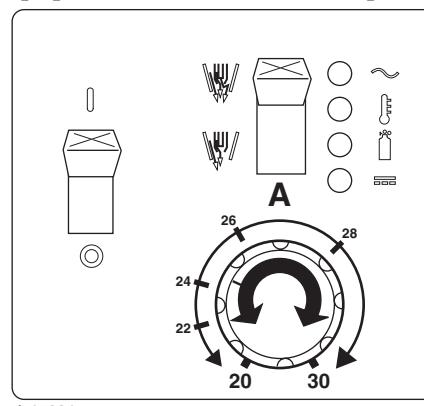


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H. Select Current Output Level

Place RUN / SET switch to RUN (up) position. Gas flow will stop. Set the desired current output level.



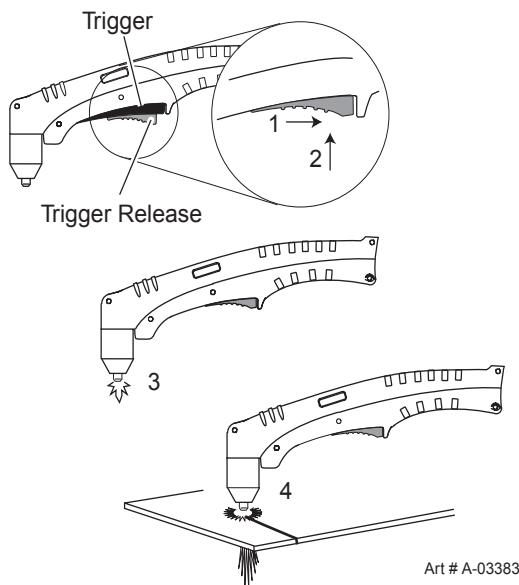
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I. Cutting Operation

Refer to Section 1, Important Safety Precautions. Wear heavy welding gloves and protective clothing. Protect eyes with appropriate shielding. Aim the torch head away from yourself. Slide the trigger release to the rear. Squeeze and hold the trigger. Gas flows for approximately 1 second, then shuts off briefly. The pilot arc then starts. DC indicator  turns on. Bring the torch within transfer distance to the workpiece. The pilot arc stops and the main arc transfers to the workpiece.

NOTE

When operating the torch in a normal condition, a small amount of gas vents through the gap between the shield cup and torch handle. Do not attempt to over tighten the shield cup as irreparable damage to internal components may result.



J. Cutting Technique

Hold the torch with one or two hands, with the torch tip close to the workpiece. Do not cut or handle the workpiece without welding gloves and protective clothing. Always wear protective eye shielding when cutting or gouging. Move the torch along the cut line so the arc penetrates the workpiece and sparks emerge from the bottom of the cut. Good cutting speeds create a slight trailing arc.

K. Postflow

Release the trigger to stop the cutting arc. Gas continues to flow for approximately 10 seconds. During post-flow, if the user moves the trigger release to the rear and presses the trigger, the pilot arc starts. The main arc transfers to the workpiece if the torch tip is within transfer distance to the workpiece.

I. Shutdown

Turn the ON / OFF switch to OFF (down). All Power Supply indicators shut off. Unplug the input power cord or disconnect input power. Power is removed from the system.

4.03 Sequence of Operation

The following is a typical sequence of operation for this power supply. Refer to Appendix 1 for block diagram.

1. Plug the input power cord into an active circuit.
 - a. AC power is available at the Power Supply.
2. Place the ON / OFF switch on the Power Supply to ON (up) position.
 - a. AC indicator  turns on; fan turns on.

NOTES

If there is adequate gas supply pressure to the power supply, gas comes on if Torch Trigger is pressed.

If torch trigger is held while user turns on main AC power, system goes into 'protective interlock' mode. AC indicator flashes; torch will not pilot. Release torch trigger, turn AC switch OFF then ON.

3. Put RUN / SET switch to SET (down position).
 - a. Gas flows to set pressure. Turn gas pressure adjustment knob to set pressure to 65 psi / 4.5 bar; Gas indicator  turns ON when there is sufficient gas pressure for power supply operation.

NOTE

Minimum pressure for power supply operation is lower than minimum pressure for torch operation.

4. Put RUN / SET switch to RUN (up position). Gas flow stops.
5. Wear protective clothing and welding gloves. Protect eyes. Slide the trigger release to the rear; squeeze and hold the trigger. Gas flows briefly, then shuts off momentarily. Then gas flow will resume. Pilot arc is established. DC indicator  turns ON. Move Torch within transfer distance of workpiece.
 - a. Main arc transfers to workpiece.
6. Complete cutting operation.

NOTE

If the torch is lifted from the workpiece while the torch switch is activated, the main arc will stop and the pilot arc will automatically restart.

7. Release the torch trigger.
 - a. Main arc stops; gas flows for approximately 10 seconds.
8. Set the power supply ON / OFF switch to OFF (down position).
 - a. AC indicator  turns OFF; fan turns OFF.
9. Set the main power disconnect to OFF, or unplug input power cord.
 - a. Input power is removed from the system.

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SECTION 4 TORCH: OPERATION

4T.01 Introduction

This section provides a description of the SL60 and SL100 Torch Assemblies followed by operating procedures.

4T.02 Functional Overview

The Torch is designed to operate with various Power Supplies to provide a plasma cutting system which can cut most metals. With gouging torch parts the torch can be used for plasma arc gouging.

NOTE

Refer to Appendix Pages for additional information as related to the Power Supply used.

4T.03 Getting Started

Follow this procedure at the beginning of each shift:



WARNING

Disconnect primary power at the source before assembling or disassembling power supply, torch parts, or torch and leads assemblies.

Torch Parts

Check the torch for proper assembly. Install proper torch parts for the desired application (refer to next SubSection called "Torch Parts Selection").

Input Power

Check the power source for proper input voltage. Close main disconnect switch or plug unit in to supply primary power to the system.

Work Cable

Check for a solid cable connection to the workpiece.

Gas Supply

Select desired single gas supply. Make sure gas sources meet requirements (see Note). Check connections and turn gas supply on.

NOTE

Refer to Appendix Pages for additional information as related to the Power Supply used.

Power On

Place the ON - OFF Switch on the Power Supply to the ON position.

Function Control Knob

If the Function Control Knob is in SET position, gas will flow. If the control knob is in the RUN position there will be no gas flow.

Current Output Level

At the Power Supply, set the desired current output level. For drag cutting set the control at 40 amps or less only.

Pressure Settings

Place the Function Control Knob to the SET position. Adjust the gas pressure control on the Power Supply for the proper gas pressure. Refer to Appendix Pages for gas pressure and other specifics.

Ready for Operation

Return the Function Control Knob to RUN position.

NOTES

For general cutting, use the RUN position which provides normal torch operation where the torch switch must be held throughout the main arc transfer.

For specific applications, use the LATCH position where the torch switch can be released after the main arc transfer. The torch remains activated until the main arc breaks from the workpiece.

Refer to Appendix 1 for a typical detailed block diagram of Sequence of Operation.

The system is now ready for operation.

4T.04 Torch Parts Selection

Depending on the type of operation to be done determines the torch parts to be used.

Type of operation:

Drag cutting, standoff cutting or gouging

Torch parts:

Shield Cup, Cutting Tip, Electrode and Starter Cartridge

NOTE

Refer to Section 6 and the Appendix Pages for additional information on torch parts.

Change the torch parts for a different operation as follows:

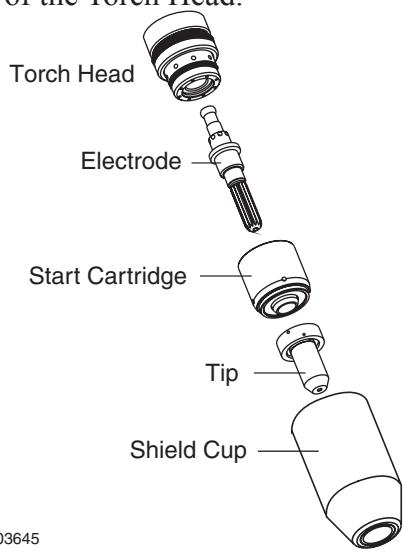
**WARNING**

Disconnect primary power at the source before assembling or disassembling torch parts, or torch and leads assemblies.

NOTE

The shield cup holds the tip and starter cartridge in place. Position the torch with the shield cup facing upward to keep these parts from falling out when the cup is removed.

1. Unscrew and remove the shield cup assembly from the torch head.
2. Remove the Electrode by pulling it straight out of the Torch Head.



Torch Parts

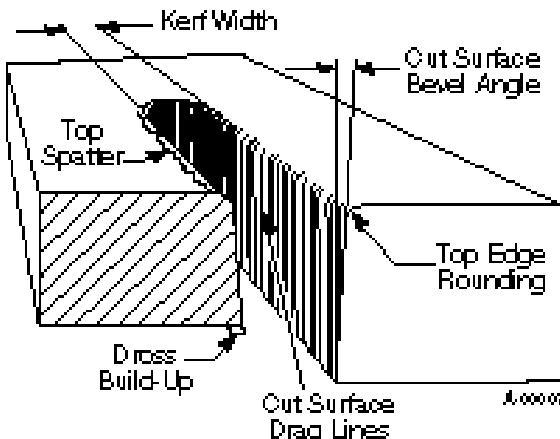
3. Install the replacement Electrode by pushing it straight into the torch head until it clicks.
4. Install the starter cartridge and desired tip for the operation into the torch head.
5. Hand tighten the shield cup until it is seated on the torch head. If resistance is felt when installing the cup, check the threads before proceeding.

4T.05 Cut Quality**NOTES**

Cut quality depends heavily on setup and parameters such as torch standoff, alignment with the workpiece, cutting speed, gas pressures, and operator ability.

Refer to Appendix Pages for additional information as related to the Power Supply used.

Cut quality requirements differ depending on application. For instance, nitride build - up and bevel angle may be major factors when the surface will be welded after cutting. Dross - free cutting is important when finish cut quality is desired to avoid a secondary cleaning operation. The following cut quality characteristics are illustrated in the following figure:



Cut Quality Characteristics

Cut Surface

The desired or specified condition (smooth or rough) of the face of the cut.

Nitride Build - Up

Nitride deposits can be left on the surface of the cut when nitrogen is present in the plasma gas stream. These buildups may create difficulties if the material is to be welded after the cutting process.

Bevel Angle

The angle between the surface of the cut edge and a plane perpendicular to the surface of the plate. A perfectly perpendicular cut would result in a 0° bevel angle.

Top - Edge Rounding

Rounding on the top edge of a cut due to wearing from the initial contact of the plasma arc on the workpiece.

Bottom Dross Buildup

Molten material which is not blown out of the cut area and resolidifies on the plate. Excessive dross may require secondary cleanup operations after cutting.

Kerf Width

The width of the cut (or the width of material removed during the cut).

Top Spatter (Dross)

Top spatter or dross on the top of the cut caused by slow travel speed, excess cutting height, or cutting tip whose orifice has become elongated.

4T.06 General Cutting Information**WARNINGS**

Disconnect primary power at the source before disassembling the power supply, torch, or torch leads.

Frequently review the Important Safety Precautions at the front of this manual. Be sure the operator is equipped with proper gloves, clothing, eye and ear protection. Make sure no part of the operator's body comes into contact with the workpiece while the torch is activated.

**CAUTION**

Sparks from the cutting process can cause damage to coated, painted, and other surfaces such as glass, plastic and metal.

NOTE

Handle torch leads with care and protect them from damage.

Piloting

Piloting is harder on parts life than actual cutting because the pilot arc is directed from the electrode to the tip rather than to a workpiece. Whenever possible, avoid excessive pilot arc time to improve parts life.

Torch Standoff

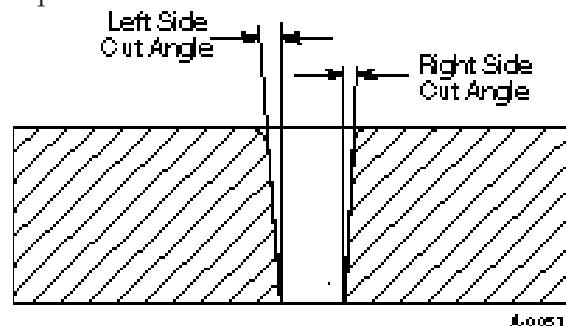
Improper standoff (the distance between the torch tip and workpiece) can adversely affect tip life as well as shield cup life. Standoff may also significantly affect the bevel angle. Reducing standoff will generally result in a more square cut.

Edge Starting

For edge starts, hold the torch perpendicular to the workpiece with the front of the tip near (not touching) the edge of the workpiece at the point where the cut is to start. When starting at the edge of the plate, do not pause at the edge and force the arc to "reach" for the edge of the metal. Establish the cutting arc as quickly as possible.

Direction of Cut

In the torches, the plasma gas stream swirls as it leaves the torch to maintain a smooth column of gas. This swirl effect results in one side of a cut being more square than the other. Viewed along the direction of travel, the right side of the cut is more square than the left.



Side Characteristics Of Cut

To make a square - edged cut along an inside diameter of a circle, the torch should move counterclockwise around the circle. To keep the square edge along an outside diameter cut, the torch should travel in a clockwise direction.

Dross

When dross is present on carbon steel, it is commonly referred to as either "high speed, slow speed, or top dross". Dross present on top of the plate is normally caused by too great a torch to plate distance. "Top dross" is normally very easy to remove and can often be wiped off with a welding glove. "Slow speed dross" is normally present on the bottom edge of the plate. It can vary from a light to heavy bead, but does not adhere tightly to the cut edge, and can be easily scraped off. "High speed dross" usually forms a narrow bead along the bottom of the cut edge and is very difficult to remove. When cutting a troublesome steel, it is sometimes useful to reduce the cutting speed to produce "slow speed dross". Any resultant cleanup can be accomplished by scraping, not grinding.

4T.07 Hand Torch Operation

Standoff Cutting With Hand Torch

NOTE

For best performance and parts life, always use the correct parts for the type of operation.

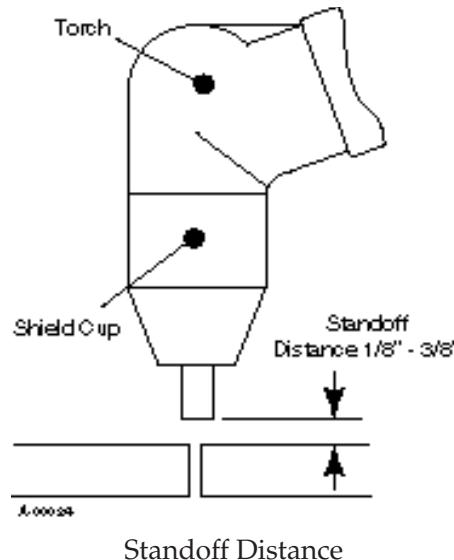
1. The torch can be comfortably held in one hand or steadied with two hands. Position the hand to press the Trigger on the torch handle. With the hand torch, the hand may be positioned close to the torch head for maximum control or near the back end for maximum heat protection. Choose the holding technique that feels most comfortable and allows good control and movement.

NOTE

The tip should never come in contact with the workpiece except during drag cutting operations.

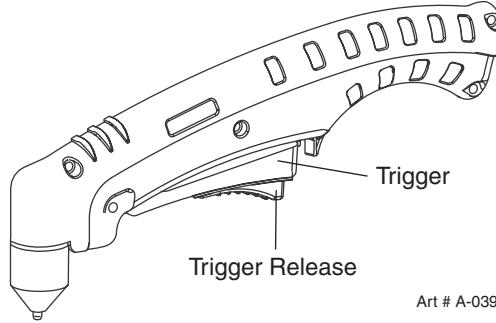
2. Depending on the cutting operation, do one of the following:
 - a. For **edge starts**, hold the torch perpendicular to the workpiece with the front of the tip on the edge of the workpiece at the point where the cut is to start.

- b. For **standoff cutting**, hold the torch 1/8 - 3/8 in (3-9 mm) from the workpiece as shown below.



Standoff Distance

3. Hold the torch away from your body.
4. Slide the trigger release toward the back of the torch handle while simultaneously squeezing the trigger. The pilot arc will start.

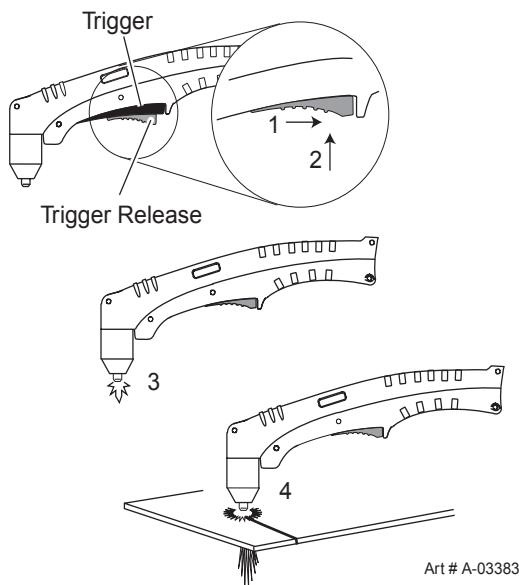


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5. Bring the torch within transfer distance to the work. The main arc will transfer to the work, and the pilot arc will shut off.

NOTE

The gas preflow and postflow are a characteristic of the power supply and not a function of the torch.

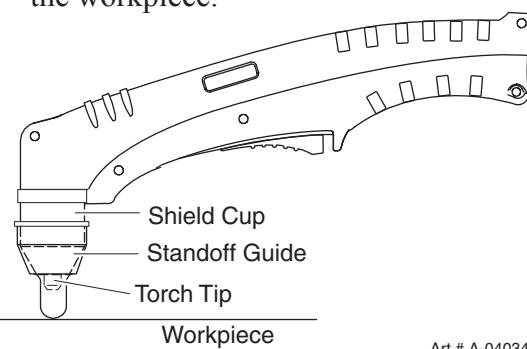


6. Cut as usual. Simply release the trigger assembly to stop cutting.
7. Follow normal recommended cutting practices as provided in the power supply operating manual.

NOTE

When the shield cup is properly installed, there is a slight gap between the shield cup and the torch handle. Gas vents through this gap as part of normal operation. Do not attempt to force the shield cup to close this gap. Forcing the shield cup against the torch head or torch handle can damage components.

8. For a consistent standoff height from the workpiece, install the standoff guide by sliding it onto the torch shield cup. Install the guide with the legs at the sides of the shield cup body to maintain good visibility of the cutting arc. During operation, position the legs of the standoff guide against the workpiece.

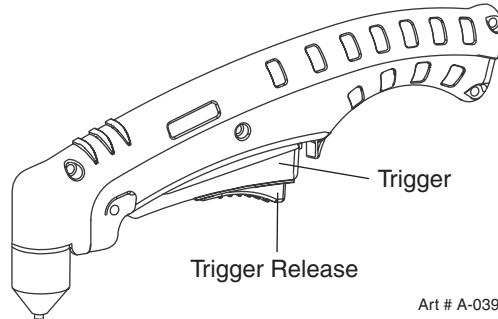
**Drag Cutting With a Hand Torch**

Drag cutting works best on metal 3/16" (4.7 mm) thick or less.

NOTE

For best parts performance and life, always use the correct parts for the type of operation.

1. Install the drag cutting tip and set the output current to 30 amps or less.
2. The torch can be comfortably held in one hand or steadied with two hands. Position the hand to press the Trigger on the torch handle. With the hand torch, the hand may be positioned close to the torch head for maximum control or near the back end for maximum heat protection. Choose the holding technique that feels most comfortable and allows good control and movement.
3. Keep the torch in contact with the workpiece during the cutting cycle.
4. Hold the torch away from your body.
5. Slide the trigger release toward the back of the torch handle while simultaneously squeezing the trigger. The pilot arc will start.

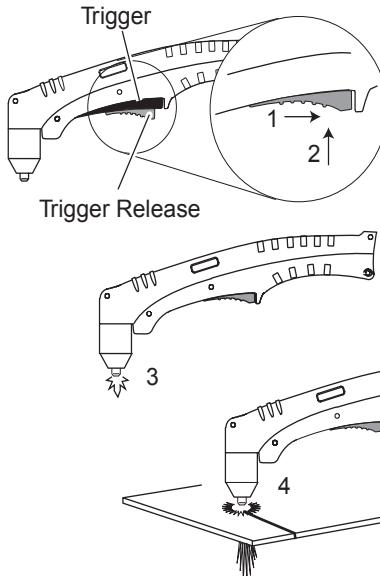


Art # A-03962

7. Bring the torch within transfer distance to the work. The main arc will transfer to the work, and the pilot arc will shut off.

NOTE

The gas preflow and postflow are a characteristic of the power supply and not a function of the torch.



8. Cut as usual. Simply release the trigger assembly to stop cutting.
9. Follow normal recommended cutting practices as provided in the power supply operating manual.

NOTE

When the shield cup is properly installed, there is a slight gap between the shield cup and the torch handle. Gas vents through this gap as part of normal operation. Do not attempt to force the shield cup to close this gap. Forcing the shield cup against the torch head or torch handle can damage components.

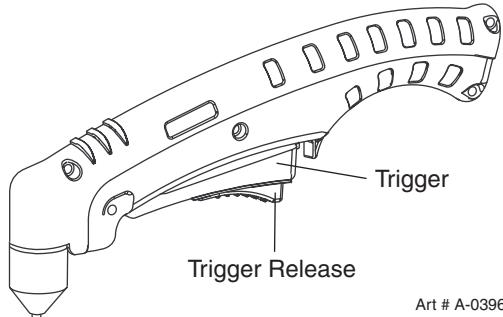
Piercing With Hand Torch

1. The torch can be comfortably held in one hand or steadied with two hands. Position the hand to press the Trigger on the torch handle. With the hand torch, the hand may be positioned close to the torch head for maximum control or near the back end for maximum heat protection. Choose the technique that feels most comfortable and allows good control and movement.

NOTE

The tip should never come in contact with the workpiece except during drag cutting operations.

2. Angle the torch slightly to direct blowback particles away from the torch tip (and operator) rather than directly back into it until the pierce is complete.
3. In a portion of the unwanted metal start the pierce off the cutting line and then continue the cut onto the line. Hold the torch perpendicular to the workpiece after the pierce is complete.
4. Hold the torch away from your body.
5. Slide the trigger release toward the back of the torch handle while simultaneously squeezing the trigger. The pilot arc will start.



6. Bring the torch within transfer distance to the work. The main arc will transfer to the work, and the pilot arc will shut off.

NOTE

The gas preflow and postflow are a characteristic of the power supply and not a function of the torch.

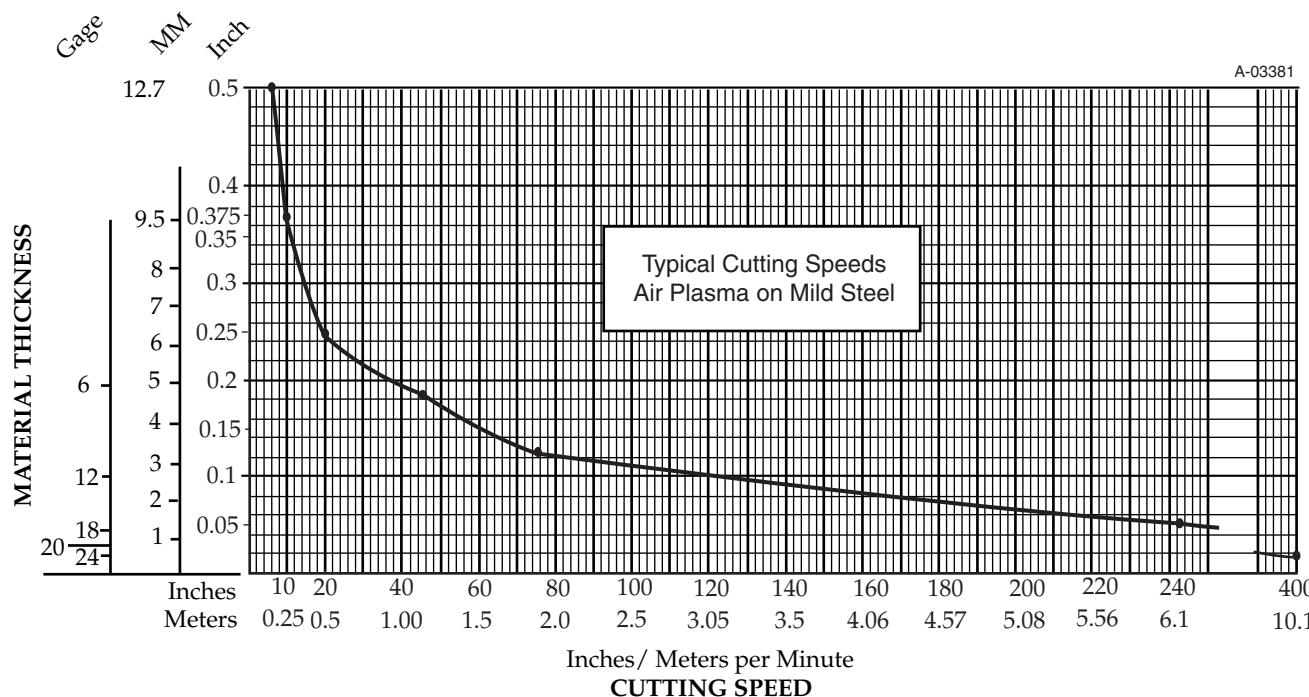
When the shield cup is properly installed, there is a slight gap between the shield cup and the torch handle. Gas vents through this gap as part of normal operation. Do not attempt to force the shield cup to close this gap. Forcing the shield cup against the torch head or torch handle can damage components.

7. Clean spatter and scale from the shield cup and the tip as soon as possible. Spraying the shield cup in anti - spatter compound will minimize the amount of scale which adheres to it.

mm) distance for optimum speed and cut quality. Clean spatter and scale from the shield cup and the tip as soon as possible. Spraying or dipping the shield cup in anti - spatter compound will minimize the amount of scale which adheres to it.

4T.08 Recommended Cutting Speeds

Cutting speeds vary according to torch output, the type of material being cut, and operator skill. Speeds shown are typical for this cutting system using air plasma to cut mild steel, with output current at 30 amps and torch held at 0 - 1/16" (0 - 1.6 mm) standoff.



Output current setting or cutting speeds may be reduced to allow slower cutting when following a line, using a template or cutting guide while still producing cuts of excellent quality.

4T.09 Gouging



WARNINGS

Be sure the operator is equipped with proper gloves, clothing, eye and ear protection and that all safety precautions at the front of this manual have been followed. Make sure no part of the operator's body comes in contact with the workpiece when the torch is activated.

Disconnect primary power to the system before disassembling the torch, leads, or power supply.



CAUTIONS

Sparks from plasma gouging can cause damage to coated, painted or other surfaces such as glass, plastic, and metal.

Check torch parts. The torch parts must correspond with the type of operation. Refer to Section 6 and the Appendix Pages for additional information on torch parts.

Gouging Parameters

Gouging performance depends on parameters such as torch travel speed, current level, lead angle (the angle between the torch and workpiece), and the distance between the torch tip and workpiece (standoff).

Torch Travel Speed

NOTE

Refer to Appendix Pages for additional information as related to the Power Supply used.

Optimum torch travel speed is dependent on current setting, lead angle, and mode of operation (hand or machine torch).

Current Setting

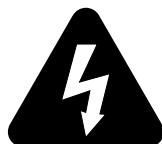
Current settings depend on torch travel speed, mode of operation (hand or machine torch), and the amount of material to be removed.

Lead Angle

The angle between the torch and workpiece depends on the output current setting and torch travel speed. At 80 amps, the recommended lead angle is 35°. At a lead angle greater than 45° the molten metal will not be blown out of the gouge and may be blown back onto the torch. If the lead angle is too small (less than 35°), less material may be removed, requiring more passes. In some applications, such as removing welds or working with light metal, this may be desirable.

SECTION 5 SYSTEM: SERVICE

5.01 General Maintenance



Warning!

Disconnect input power before maintaining.

Maintain more often
if used under severe
conditions

Each Use

Visual check of
torch tip and electrode

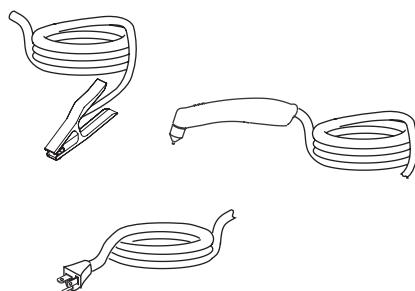


Weekly

Visually inspect the torch body tip,
electrode, start cartridge and shield cup



Visually inspect the
cables and leads.
Replace as needed

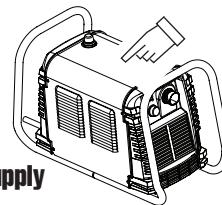


3 Months

Replace all
broken parts

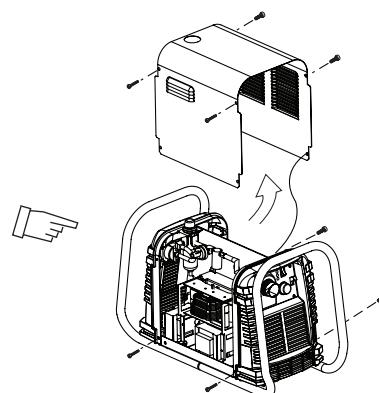
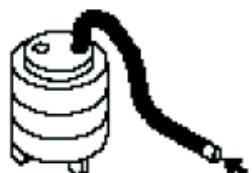


Clean
exterior
of power supply



6 Months

Visually check and
Carefully clean the
interior



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A. Each Use

Check torch consumables for wear, replace if necessary.



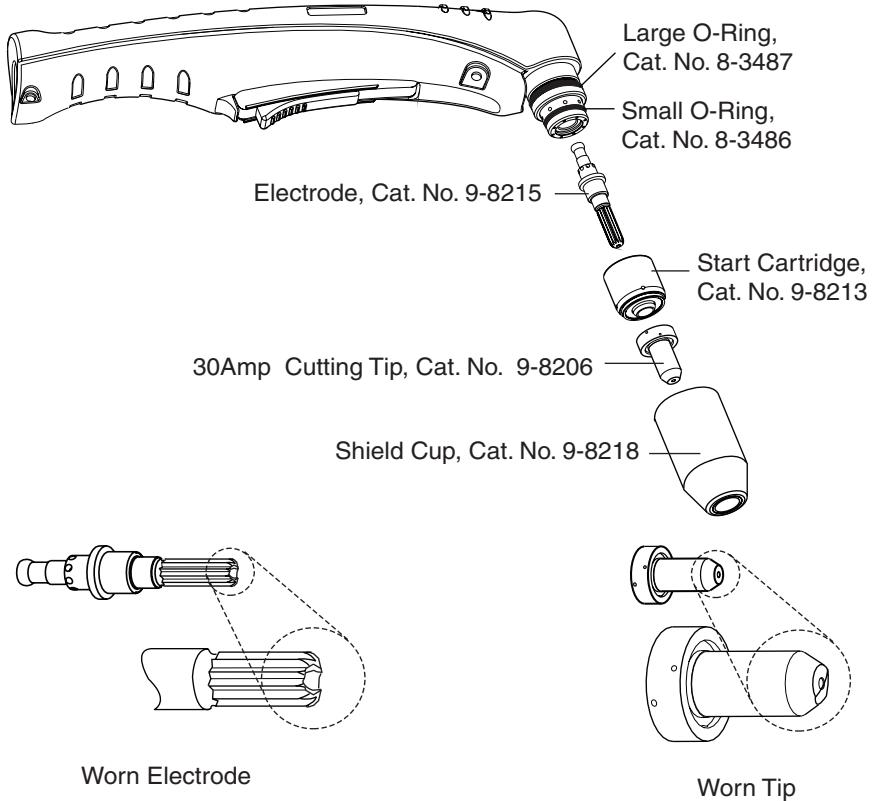
WARNING

Shut off power before inspecting or removing torch parts.

NOTE

When operating the torch in a normal condition, a small amount of gas vents through the gap between the shield cup and torch handle. Do not attempt to over tighten the shield cup as irreparable damage to internal components may result.

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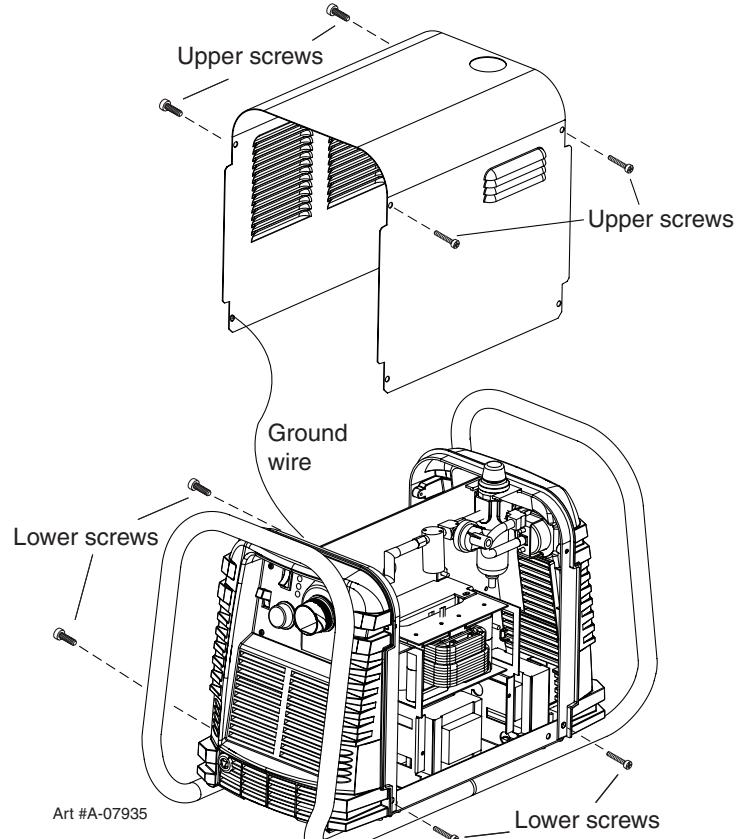


B. Every three months**A. Check internal air filter, replace if necessary.**

1. Shut off input power; turn off the gas supply. Bleed down the gas supply.
2. Remove the upper cover screws.
3. Loosen the lower screws. Pull the cover up and away from the unit.

NOTE

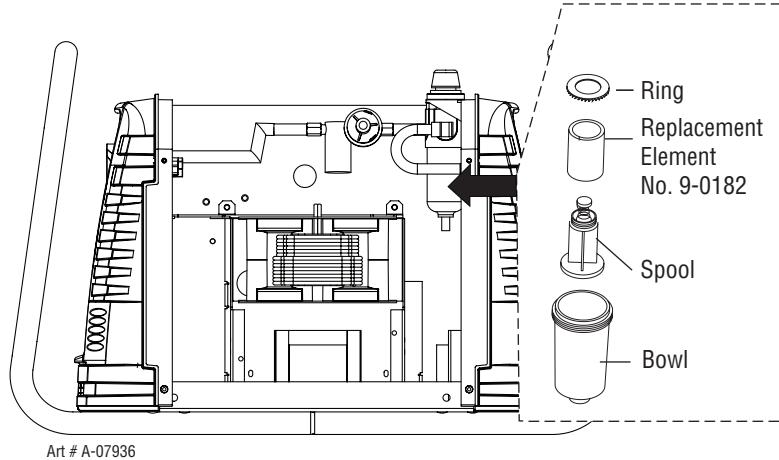
Leave internal ground wire in place.



Cover Removal

CUTMASTER 39

4. Pull the upper end of the drain tube off the fitting on the filter bowl
5. Unscrew the bowl. The filter element will be visible and still attached to the main body of the Regulator / Filter.
6. Unscrew the filter element from the Regulator / Filter body. The filter element will come off with a spool and some additional pieces.
7. Note the correct assembly of the filter / spool then remove the filter from the spool and either clean it or replace it.
8. Screw the filter element and spool, with the baffle ring in place (teeth facing downward) back into the Regulator body by compressing the spring on the spool. Tighten firmly by hand.



Regulator / Filter Element Replacement

9. Clean the inside of the bowl if necessary. Check that the knurled valve on the bottom of the bowl is fully open.
10. Reinstall the bowl. Reconnect the drain tube.
11. Reinstall the cover as follows:
 - a. Reconnect the ground wire, if necessary.
 - b. Set the cover onto the base so that it rests on the lower screws.
 - c. Tighten lower screws.
 - d. Reinstall and tighten the upper screws.
12. Turn on the air supply.

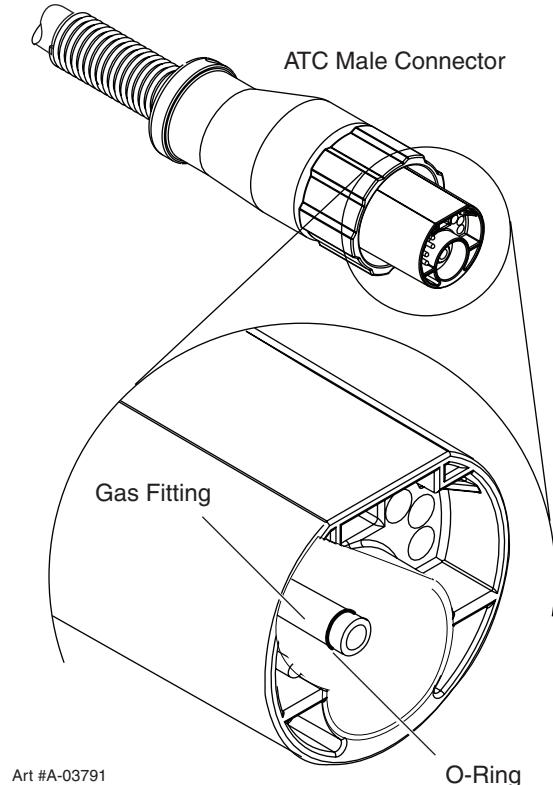
C. O-Ring Lubrication

An o-ring on the Torch ATC Male Connector requires lubrication on a regular basis, depending on how frequently the torch is disconnected and re-connected. This will allow the o-ring to remain pliable and provide a proper seal. The o-ring will dry out, becoming hard and cracked, if the o-ring lubricant is not used on a regular basis. This can lead to potential performance problems.

It is recommended to apply a very light film of o-ring lubricant (Catalog # 8-4025) to the o-ring on a weekly basis.

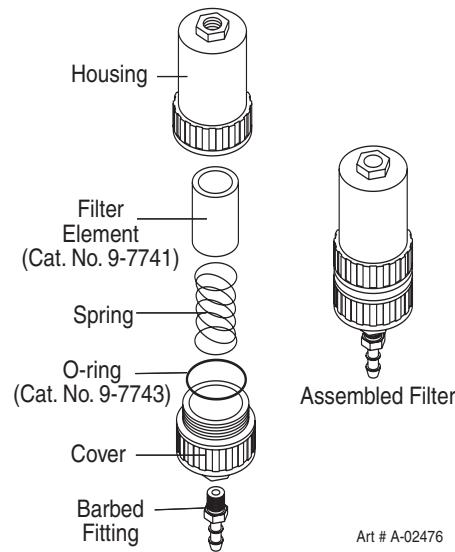
NOTE

DO NOT use other lubricants or grease, they may not be designed to operate within high temperatures or may contain "unknown elements" that may react with the atmosphere. This reaction can leave contaminants inside the torch. Either of these conditions can lead to inconsistent performance or poor parts life.



D. Check Optional Single - Stage Filter Element, replace if necessary.

1. Shut off input power.
2. Shut off air supply, bleed down system.
3. Disconnect gas supply hose from filter.
4. Turn the Cover counter - clockwise.
5. Remove the Filter Element from the Housing and set Element aside to dry.
6. Wipe inside of housing clean, then insert the replacement Filter Element open side first.
7. Replace Housing on Cover.
8. Reattach gas supply hose. If unit leaks between housing and cover, inspect the "O" Ring for cuts or other damage.



5.02 Common Faults

Problem - Symptom	Common Cause
Insufficient Penetration	1. Cutting speed too fast. 2. Torch tilted too much. 3. Metal too thick. 4. Worn torch parts 5. Cutting current too low. 6. Non - Genuine Thermal Dynamics parts used 7. Incorrect gas pressure
Main Arc Extinguishes	1. Cutting speed too slow. 2. Torch standoff too high from workpiece. 3. Cutting current too high. 4. Work cable disconnected. 5. Worn torch parts. 6. Non - Genuine Thermal Dynamics parts used
Excessive Dross Formation	1. Cutting speed too slow. 2. Torch standoff too high from workpiece. 3. Worn torch parts. 4. Improper cutting current. 5. Non - Genuine Thermal Dynamics parts used 6. Incorrect gas pressure
Short Torch Parts Life	1. Oil or moisture in air source. Exceeding system capability (material too thick). 3. Excessive pilot arc time 4. Gas pressure too low. 5. Improperly assembled torch. 6. Non - Genuine Thermal Dynamics parts used
Difficult Starting	1. Worn torch parts. 2. Non - Genuine Thermal Dynamics parts used. 3. Incorrect gas pressure.

5.03 Circuit Fault Isolation

This section is to help isolate the defective circuit before troubleshooting, identify symptoms, and test the unit for proper operation. Follow the instructions as given to identify the possible symptom(s) and the defective circuit. After repairs are complete, run the following tests again to verify that the unit is fully operational.

A. Initial Setup Conditions

1. Connect gas supply to rear of Power Supply.
2. Turn on gas supply and adjust Power Supply Gas Regulator to 65 psi / 4.5 bar.
3. Set the Power Supply controls as follows:
 - ON/OFF  switch to OFF .
 - CURRENT (A) control knob to maximum
 - RUN / SET switch to SET

B. Main Input and Internal Power Tests

1. Connect main AC power to the unit.
2. Set the Power Supply ON/OFF switch to ON (up position) and check the following:
 - AC indicator  steady ON
 - TEMP Indicator  OFF
 - GAS Indicator  ON
 - Gas flows from torch
 - Fan operates
 - DC Indicator  is OFF
3. Turn RUN / SET switch to RUN
 - Gas should stop flowing
4. Turn ON / OFF switch to OFF, then back to ON. Check the following:
 - AC indicator ON
 - Temp indicator OFF
 - Gas indicator ON (gas does not flow)
 - Fan Operates
 - DC indicator OFF

This completes the Main Input and Internal Power Tests. If the unit functions as described then proceed to paragraph 'C'. If the unit does not function as described then note the symptom and proceed to Subsection 5.04, Main Input and Internal Power Problems.

C. Pilot Arc Test

1. Close the torch switch and check the following:
 - Gas flows briefly, then stops.
 - Gas flow re-starts; pilot arc starts. DC indicator is ON.

This completes the Pilot Arc Test. If the equipment operates as described then proceed to paragraph 'D'. If the equipment does not function as noted then note the symptom and proceed to Subsection 5.05, Pilot Arc Problems.

D. Main Arc Test

Activate the Torch to establish a pilot arc.

Bring the torch to approximately 3/16" (4.7 mm) from the workpiece to establish the main cutting arc, and note the following:

- Main cutting arc starts
- Cutting arc transfers to workpiece

This completes the Main Arc Test. If the equipment operates as described, proceed to Subsection 5.04. If problems still persist then contact Technical Services.

If the equipment does not function as described, note the symptom and proceed to Subsection 5.06, Main Arc Problems.

5.04 Main Input and Internal Power Problems

Locate your symptom below:

A. Main power line fuses blow as soon as main disconnect is closed

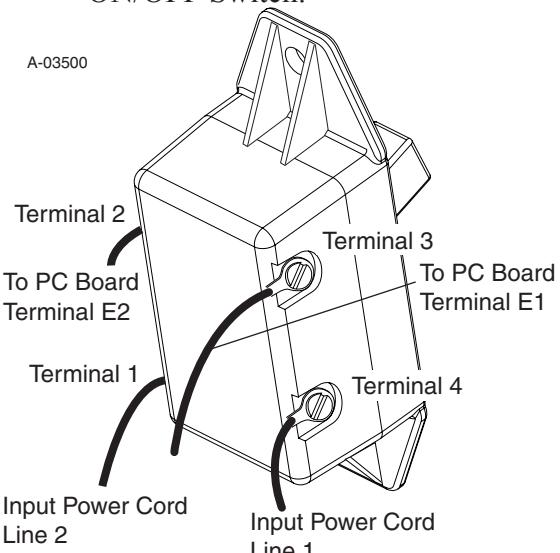
1. Input power cable installed incorrectly or defective
 - a. Refer to the Appendix pages for PC Board Wiring Layout. Check the input power cable for proper connections. Reconnect if necessary.
 - b. Test input power cable for continuity through all conductors. Replace cable if any conductor does not show continuity.

B. Main power line fuses blow immediately after the ON/OFF Switch is turned on.

1. Faulty input diode bridge(s)
 - a. Test input diode bridges per section 4.10-D; replace as needed.

C. Fan does not operate; AC indicator is OFF

1. Front Panel ON/OFF switch in OFF (down) position
 - a. Place switch to ON (up) position.
2. Main power disconnect open (OFF)
 - a. Close main power disconnect.
3. Main power line fuses blown
 - a. Replace main power line fuses.
4. Input power cable disconnected or faulty
 - a. Check power cable for proper connections to On/Off Switch.
 - b. Check power cable for continuity through all conductors.
5. Wires from On/Off Switch to PC Board disconnected or faulty
 - a. Check for proper connections.
 - b. Disconnect wires; check for continuity.
6. Faulty ON/OFF switch
 - a. Disconnect primary input power. Set the On/Off switch to ON (UP) position. Test for continuity between terminals 1 and 2, and between terminals 3 and 4. If there is no continuity, replace the ON/OFF Switch.



7. Faulty Bias Transformer
 - a. Refer to PC Board Wiring Layout in the Appendix. Test for 380-410 vdc between TP-21 and TP-101 on PC Board. If voltage is not correct, replace the PC Board.

D. AC indicator flashing; TEMP indicator OFF (on system start-up); RUN / SET switch in RUN position

1. Torch shield cup loose
 - a. Shut power supply off. Tighten shield cup securely. Turn unit back on.
2. Torch connection at power supply loose.
 - a. Shut power supply off. Tighten torch leads male connector into female receptacle on power supply securely. Turn power supply back on.
3. Faulty PIP switch or open PIP wires in torch leads
 - a. Check torch PIP switch for continuity.
 - b. Check torch PIP leads for continuity.
4. J3 wire connector disconnected from PC board.
 - a. Check J3 connector; reconnect if necessary.

E. Gas flows continuously; AC indicator ON; TEMP indicator OFF; DC indicator OFF; GAS indicator ON

1. RUN /SET Switch in SET (down) position
 - a. Change to RUN (up) position.
2. Faulty RUN / SET switch
 - a. Disconnect primary input power. Disconnect wires from RUN / SET switch. Put switch in RUN (up) position. Check switch for open condition. If switch is shorted, replace switch.

F. AC indicator flashing (on start-up); TEMP indicator OFF; RUN / SET switch in RUN position; gas flows from torch

1. Torch switch stuck ON or torch switch wires shorted
 - a. Check indicator D22 on PC board. Indicator should be OFF unless torch switch is closed.
 - b. Check torch switch for proper operation.
 - c. Check torch switch for continuity.

G. AC indicator flashing (on start-up); TEMP indicator OFF, RUN / SET switch in RUN position,

1. Torch tip, starter cartridge, or electrode missing or badly worn.
 - a. Check torch parts; replace as needed.

2. Dirty or defective starter cartridge
 - a. Check starter cartridge; clean or replace as needed.
3. Wire E8 not connected to PC Board terminal E8
 - a. Check connection; reconnect if necessary.
4. PC board fault circuit defective
 - a. Replace PC board

H. AC indicator flashes; Temp indicator steady ON

1. Fan wire harness disconnected from terminal J4 on PC board.
 - a. Check fan wire harness; reconnect if necessary
2. Faulty fan or fan wire harness
 - a. Check fan and harness; replace as needed.

I. AC indicator flashes; TEMP indicator blinks slowly; RUN/SET switch in SET position

1. Fan is blocked
 - a. Check fan blades; clear as needed.
2. Faulty PC Board
 - a. Replace PC Board

J. No gas flow; AC indicator ON; TEMP indicator OFF; DC indicator OFF; Gas indicator ON; RUN/SET switch in SET position

1. Inlet gas pressure too high (over 120 psi / 8.3 bar)
 - a. Set inlet gas pressure below 120 psi / 8.3 bar
2. Faulty RUN/SET switch
 - a. Disconnect wires from RUN/SET switch. Test switch for continuity in SET position. If no continuity in SET position, replace switch.
3. Faulty gas solenoid or solenoid wire harness.
 - a. Disconnect solenoid wire harness from terminal J1 on PC board. Test resistance in wire harness. Resistance should be $20\text{ ohm} \pm 5\text{ ohm}$. If resistance is not correct, replace solenoid assembly.

4. Faulty PC board
 - a. Leave RUN/SET switch in SET position. Disconnect wire harness from terminal J1 on PC board. Test voltage across pins of terminal J1. Voltage should be 10-13vdc. If voltage is not correct, replace PC board.

K. AC indicator steady ON; TEMP indicator ON; RUN/SET switch in SET position

1. PC board temperature sensor disconnected or faulty.
 - a. Check wire harness connection at terminal J5 on PC board. Reconnect if necessary.
 - b. Disconnect PC board temperature sensor wire harness from J5 on PC board. Install a temporary jumper across the pins on PC board terminal J5. Check temperature indicator on Power Supply front panel. If TEMP indicator is OFF, replace PC board.

L. No gas flow; AC indicator ON; GAS indicator OFF; TEMP indicator OFF; DC indicator OFF; RUN/SET switch in SET position

1. Gas supply not connected to unit
 - a. Connect gas supply.
2. Gas supply not turned on
 - a. Turn gas supply on.
3. Gas pressure too low
 - a. Shut power supply off. Set gas pressure on the power supply gas regulator to 65 psi / 4.5 bar. turn power supply back on.
4. Faulty PC board
 - a. Disconnect pressure switch wire harness from terminal J9 on PC board. Test for continuity between sockets 2 and 3 on the wire harness connector. If gas pressure is above 65 psi / 4.5 bar and there is continuity between sockets 2 and 3, replace PC board.

5.05 Pilot Arc Problems

Locate your symptom below:

A. No pilot arc; Gas flows continuously; AC indicator ON; TEMP indicator OFF; GAS indicator ON; DC indicator OFF

1. Shorted Torch
 - a. Test torch and leads for continuity.
2. Faulty PC Board
 - a. Replace PC Board.

B. No arc or intermittent arc in torch; Gas flows; AC indicator ON; TEMP indicator OFF; GAS and DC indicators ON

1. Gas pressure set incorrectly (too high)
 - a. Set gas pressure on the Power Supply gas regulator to 65 psi / 4.5 bar.
2. Oil/moisture in air lines
 - a. Purge system. If problem is corrected, add filters in line with air source.
3. Torch consumable parts incorrect or worn
 - a. Refer to Operator's Manual.
4. Starter cartridge missing from torch
 - a. Shut off power. Remove shield cup from torch. Install starter cartridge if missing.
5. Faulty leads
 - a. Check continuity.
6. Faulty torch
 - a. Check continuity.
7. Faulty PC Board
 - a. Replace PC Board.

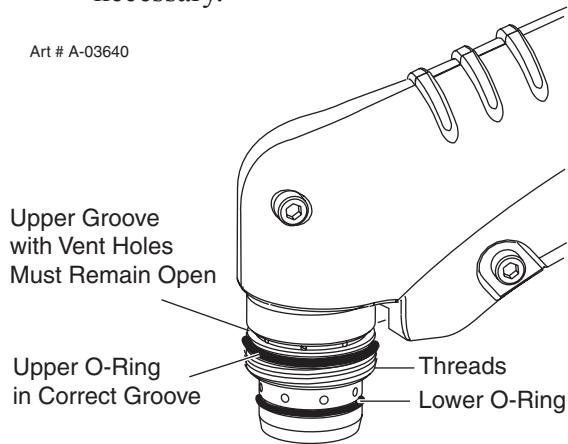
C. No pilot arc; GAS and DC indicators blink

1. Gas pressure is too low.
 - a. Set gas pressure to 65 psi / 4.5 bar.

D. No gas flow; AC and GAS indicators ON, TEMP and DC indicators OFF

1. Upper O-ring on torch head is in wrong position.
 - a. Remove shield cup from torch; check position of upper O-ring. Correct if necessary.

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5.06 Main Arc Problems

Locate your symptom below:

A. Main cutting arc will not start

1. Work cable not connected.
 - a. Connect work cable.
2. Holding too high of a standoff
 - a. Refer to Operating Manual for recommended standoff heights.
3. Workpiece is painted or rusty.
 - a. Clean workpiece.
4. Starter cartridge missing from torch
 - a. Shut off power. Remove shield cup from torch. Install starter cartridge if missing.
5. Faulty Main Power PC Board
 - a. Replace PC Board.

5.07 Test Procedures

The test procedures in this subsection are referenced in the troubleshooting section.

A. Safety Precautions

1. Significant DC Voltage exists after removal of input power. Allow two minutes for discharge time. Voltage measured on input capacitors must be zero before performing service on the power supply.
2. Do Not touch electrical components with any part of the human body when power is applied.
3. Keep away from any moving parts.
4. Hot surfaces can cause severe burns. Allow equipment to cool before servicing.
5. Electrostatic discharge can damage printed circuit board assemblies. Transport printed circuit boards in proper antistatic shielded packages. Use proper grounding techniques with wrist strap before handling printed circuit boards.
6. Misaligned plugs can cause printed circuit board damage. Be sure plugs are properly aligned and completely seated.
7. Excessive pressure can damage printed circuit board. Use only minimal pressure and gentle movement when disconnecting or connecting printed circuit board plugs.

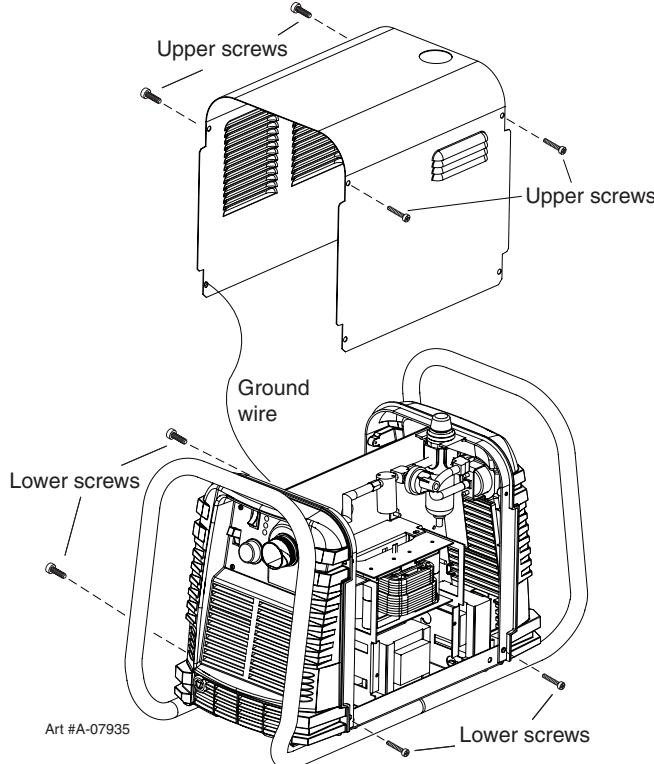
B. Opening Power Supply Enclosure

The cover of the Power Supply must be removed to gain access to the input power connections.



Disconnect primary power at the source before assembling or disassembling the Power Supply, torch parts, or torch and leads assemblies.

1. Remove the screws securing the cover to the unit.



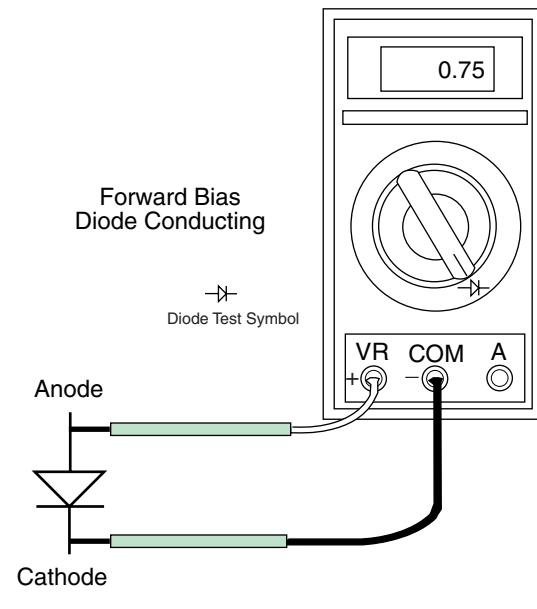
2. Carefully lift the cover up and away from the unit to gain access to the ground wire connection on the inside of the cover (left side near front).
3. Remove the nut and washer from the ground stud on the inside of the cover.
4. Install the replacement cover by reversing the above steps.

C. Diode Testing Basics

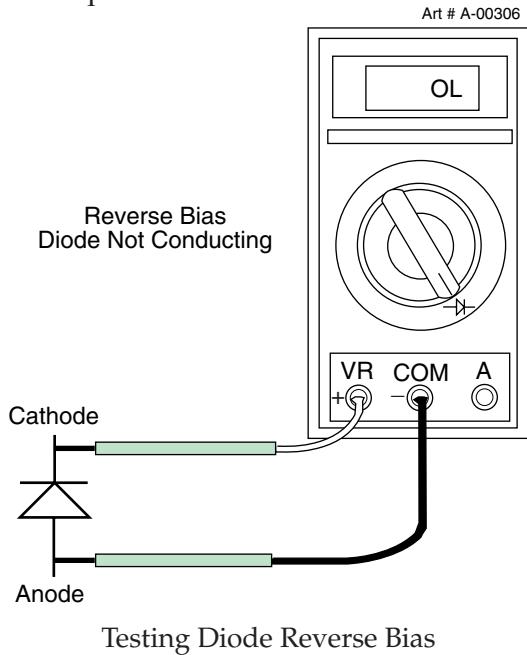
Testing of diode modules requires a digital volt/ohmmeter that has a diode test scale. Remember that even if the diode module checks good, it may still be bad. If in doubt, replace the diode module.

1. Locate the diode module to be tested.
2. Remove cables from mounting studs on diodes to isolate the module.
3. Set digital volt/ohmmeter to diode test scale.
4. Using the Figures for each test, check each diode in the module. Each diode must be checked in forward bias (plus to negative) and reverse bias (negative to plus) direction.
5. Connect the volt/ohmmeter positive lead to the anode (+) of the diode and the negative lead to the cathode (-) of the diode for forward bias testing (refer to following figure). A properly functioning diode will conduct in the forward bias direction and indicate between 0.3 to 0.9 volts.

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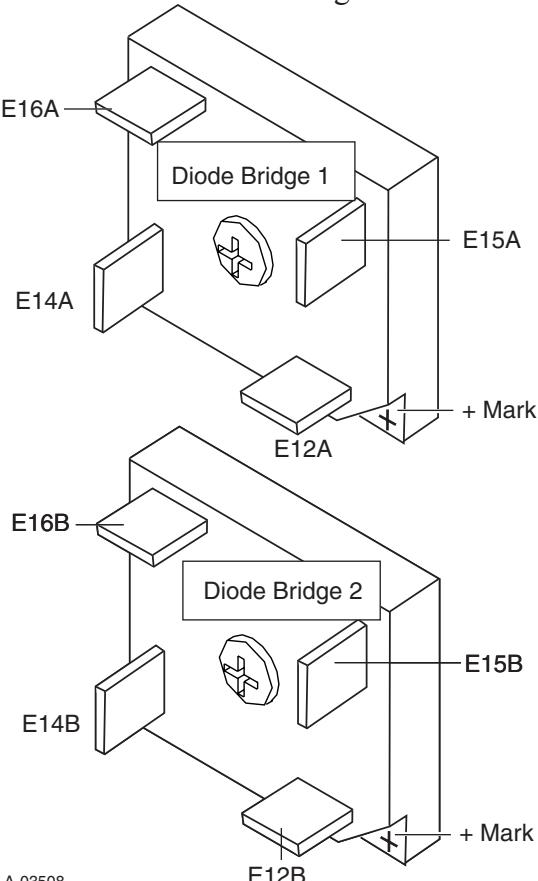


6. Reverse the meter leads across the diode for reverse bias testing (refer to following figure). A properly functioning diode will block in the reverse bias direction and depending on the meter function will indicate an open or “OL”.



D. Diode Bridge Checks

Check for shorted Diode Bridges.



Disconnect primary input power. With an ohmmeter set on the diode range, make the following checks on both diode bridges:

CutMaster 38 Diode Bridge Check		
Meter (+)	Meter (-)	Indication
E16	E15	Diode Drop
E15	E16	Open
E16	E14	Diode Drop
E14	E16	Open
E14	E12	Diode Drop
E12	E14	Open
E15	E12	Diode Drop
E12	E15	Open

The meter should indicate a diode drop in one direction and an open in the other direction for each check.

5.08 Anti-Static Handling Procedures

A. General

Caution: PC Boards can be irreparably damaged by improper handling due to electrostatic discharge (ESD).

Replacement PC Boards are shipped in a protective enclosure to prevent damage from electrostatic discharge (ESD) during shipping. Included with each replacement board is a ground strap to prevent static damage during installation.



WARNINGS

Read and understand these instructions and the instructions on the grounding wrist strap package before opening the equipment enclosure or removing the replacement PC board from its protective enclosure.

Disconnect primary power to the system before disassembling the torch, torch leads, or power supply enclosure.

Do not operate the equipment or test equipment under power while wearing the grounding wrist strap.

Observe torquing requirements where given. Failure to torque properly will cause component damage.

B. Procedure

1. Open the wrist strap and unwrap the first two folds of the band. Wrap the adhesive side firmly around your wrist.
2. Unroll the rest of the band and peel the liner from the copper foil at the opposite end.
3. Attach the copper foil to a convenient and exposed electrical ground.
4. Connect the equipment primary cable ground to the same electrical ground as the wrist strap.
5. Open the equipment enclosure and remove the failed PC board.
6. Carefully open the ESD protective bag and remove the replacement PC Board.
7. Install the replacement PC Board in the equipment and make all necessary connections.
8. Place the failed PC Board in the ESD protective bag and seal for return shipping.
9. Replace the power supply cover.
10. Remove the grounding wrist strap from your wrist and from the electrical ground connection before reconnecting primary power to the equipment.

5.09 Parts Replacement - General Information

The parts replacement procedures described in this manual require that the Power Supply be opened and partially disassembled. The part to be replaced will determine the extent of disassembly. Before removing any connection mark each wire with the connection designation. When reassembling make sure the wires go to the proper terminals.

Note the routing of wires and make sure the wires are put back in the same place when re-assembling the unit.

Refer to Section 6 for parts lists and overall detailed drawings.



WARNING

Disconnect the power supply from input power before opening or disassembling the power supply.

Before disassembling any part of the Power Supply first read the procedure for the part to be replaced, then proceed with the disassembly

5.10 Major External Parts Replacement

Refer to Section 6 for Major External Replacement Parts and overall detailed drawing.

WARNING

5.11 Front Panel Parts Replacement

Refer to Section 6 for Front Panel Replacement Parts and overall detailed drawing.



WARNING

Disconnect primary power from the source before opening or disassembling the power supply.

A. Output Control (A) Knob Replacement

1. Remove the cover per Subsection 5.07-B.
2. Turn the adjustment knob fully clockwise and note the location of the pointer on the knob.
3. Loosen the screw securing the Knob to the potentiometer shaft and remove the Knob.
4. Place the replacement Knob on the potentiometer shaft with the location of the pointer the same as noted in step 1.
5. Tighten the screw to secure the knob to the potentiometer shaft.

B. ON/OFF (I/O) Switch Replacement

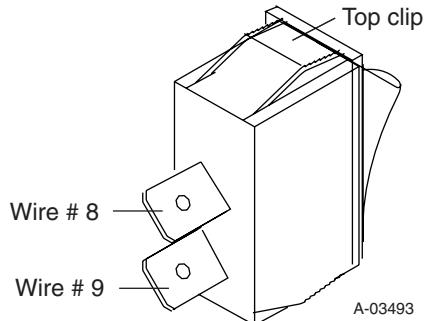
1. Remove the cover per Subsection 5.07-B.
2. Disconnect wires E1 and E2 leading from the switch to terminals E1 and E2 on the PC Board.
3. Remove Run/Set Switch per Subsection 5.11-C.
4. Remove Output Control knob per Subsection 5.11-A.
5. Remove the overlay from the front panel.
6. Remove the hardware securing the switch to the Power Supply front panel.
7. Note the positions of the wires from the input power cable to the switch.
8. Disconnect the input power cable from the switch.

9. Connect the input power cable to the replacement switch, with the wires positioned as noted previously.
10. Transfer wires E1 and E2 to the replacement switch.
11. Attach the replacement Switch to the Power Supply front panel. Tighten the hardware securely.
12. Apply new overlay to the front panel.
13. Replace the run/set switch and output control knob.
14. Connect wires E1 and E2 to terminals E1 and E2 on the PC Board.
15. Reinstall the Power Supply cover.
16. Connect the Power Supply to primary input power. Test the Power Supply for proper operation.



C. Run/Set (/) Switch Replacement

1. Remove the cover per Subsection 5.07-B.
2. Disconnect the Run/Set Switch wire harness from terminal J2 on the PC Board.
3. Squeeze together the clips on the rear of the Switch, then remove the switch and wire harness through the Front Panel.
4. Transfer the wiring harness to the replacement switch. Refer to the illustration for wire connections.



5. Pass the wiring harness through the front opening in the Power Supply. Press the switch into position in the Power Supply front panel firmly.
6. Connect the wiring harness to terminal J2 on the PC Board.
7. Reinstall the Power Supply cover.
8. Connect the Power Supply to primary input

power. Test the Power Supply for proper operation.

5.06 Left Side Internal Parts Replacement

Refer to Section 6 Left Side Internal Replacement Parts.

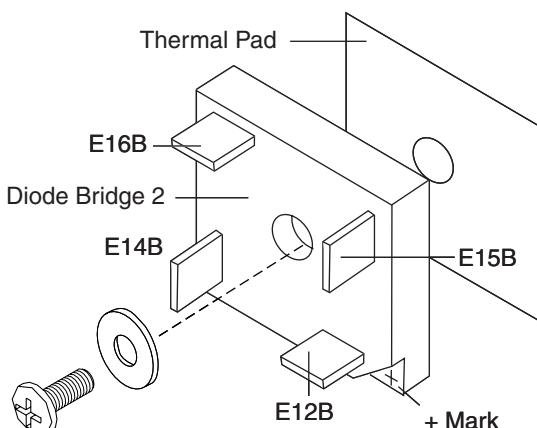
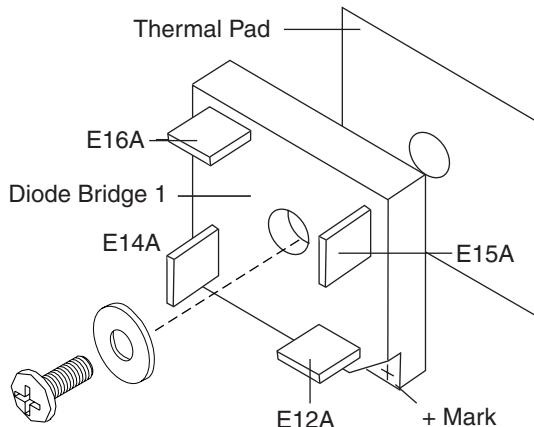


WARNING

Disconnect input power at the source and bleed down the system before attempting these procedures.

A. Diode Bridge Replacement

1. Remove the cover per Subsection 5.07-B.
2. Label and remove the wires from the diode bridge to the PC Board. Refer to the illustration.
3. Remove RTV silicone over the screw head securing the diode bridge to the Fan Panel.
4. Remove hardware securing the diode bridge to the Fan Panel.
5. Remove the diode bridge.
6. Refer to the illustration. Position the diode bridge as shown. Note the location of the notched area marked (+) on the diode bridge. Position the replacement diode bridge on the thermal pad on the Fan Panel. Replace the thermal pad if it is damaged.



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7. Secure the diode bridge to the Fan Panel with the hardware removed previously. Torque the hardware to 15 in-lbs (1.7 Nm).
8. Apply RTV silicone over the securing hardware. Use care to avoid getting RTV on the electrical connectors.
9. Refer to the illustration. Connect wires from the PC Board to the diode bridge(s) being replaced.
10. Reinstall the Power Supply cover. Test the Power Supply for proper operation.

5.12 Rear Panel Parts Replacement

Refer to Section 6 for parts list and overall detailed drawing.



WARNING

Disconnect input power at the source and bleed down the system before attempting these procedures.

A. Pressure Gauge Replacement

1. Disconnect the gas input line from the Power Supply.
2. Remove the cover per Subsection 5.07-B.
3. Disconnect the gas tube from the Pressure Switch Assembly Adapter Fitting. Hold a wrench or similar tool against the locking ring on the Fitting and pull the tube to release it.
4. Disconnect the Filter/Regulator Assembly as follows:
 - a. Pull the Regulator/Filter drain tube out of the hole in the base of the Power Supply.
 - b. Release the securing ring on the top of the Regulator/Filter Assembly.
 - c. Move the Regulator/Filter Assembly forward to disengage the inlet port and pressure gauge from the Power Supply rear panel.
5. Disconnect the Pressure Gauge air tube.
6. Loosen two nuts holding the Pressure Gauge to the rear panel.
7. Slide the Pressure Gauge out of the rear panel.

NOTE

Do Not use Teflon tape as a thread sealer, as small particles of the tape may break off and block the small gas passages in the torch.

8. Insert the replacement gauge through the front of the rear panel.
9. Tighten the two nuts securing the Pressure Gauge to the rear panel.
10. Insert the Pressure Gauge air tube into the rear of the gauge.
11. Position the Regulator / Filter Assembly in the bracket at the top of the Power Supply. Secure with the locking ring.
12. Connect the gas tube to the Pressure Switch Assembly Adapter Fitting. Push in the Fitting, and insert the gas tube. Release the Fitting. The fitting will automatically lock. Check for a secure connection.
13. Position the bottom end of the drain tube in the hole in the Power Supply base.

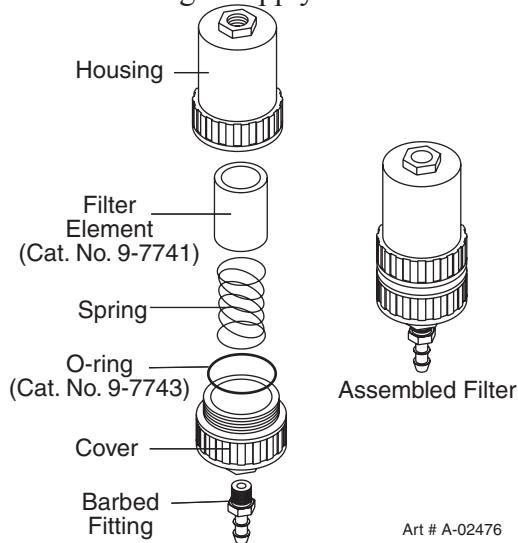
14. Reinstall the Power Supply cover. Connect the gas input line to the inlet port. Connect the Power Supply to primary input power.
15. Test the Power Supply for proper operation.

C. Optional Single-Stage Filter Element Replacement

NOTE

The Power Supply shuts down automatically when the Filter Element becomes completely saturated. The Filter Element can be removed from its housing, dried, and reused. Allow 24 hours for Element to dry.

1. Remove power from power supply.
2. Disconnect gas supply hose.



3. Turn the Cover counter-clockwise and remove it from the Filter Housing. The Filter Element is located inside the Housing.
4. Remove the Filter Element from the Housing and set Element aside to dry.
5. Wipe inside of housing clean, then insert the replacement Filter Element open side first, as shown.
6. Replace Housing on Cover.
7. Attach gas supply hose.

NOTE

If unit leaks between housing and cover, inspect the O-Ring for cuts or other damage.

5.13 Right Side Internal Parts Replacement

Refer to Section 6 for Right Side Internal Parts List and overall detailed drawing.

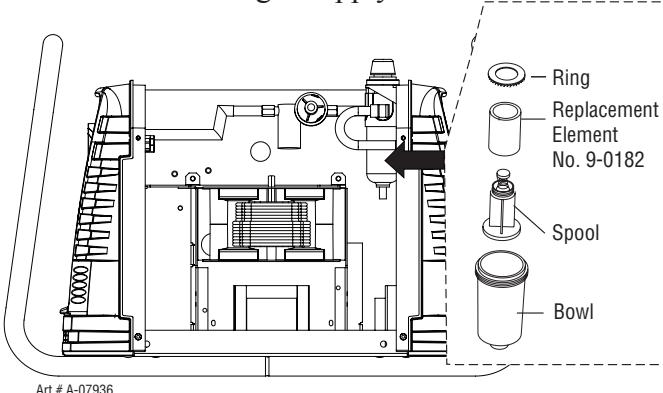


WARNING

Disconnect input power at the source and bleed down the system before attempting these procedures.

A. Standard Filter Element Replacement

1. Remove the cover per Subsection 5.07-B.
2. Remove power from the power supply; turn off the gas supply.



3. Unscrew the bowl on the bottom of the Regulator/Filter Assembly. The filter element will be visible and still attached to the main body of the Regulator/Filter Assembly.
4. Grasp the filter element and unscrew it from the Regulator/Filter body. The filter element will come off with a spool and some additional pieces.
5. Note the correct assembly of the filter/spool then remove the filter from the spool. Either clean or replace the filter element.
6. The filter element and spool, with the baffle ring in place (teeth facing downward) can be screwed back into the Regulator body by compressing the spring on the spool. Tighten firmly by hand.
7. Reinstall the bowl. Connect the drain tube to the bowl.
8. Reinstall Power Supply cover.
9. Turn on the air supply. Test the Power Supply for proper operation.

B. Pressure Switch Replacement

1. Remove the cover per Subsection 5.04-A.
2. Label and disconnect the wires to the Pressure Switch.
3. Turn the Pressure Switch to remove it from the Regulator/Filter Assembly.
4. Apply thread sealant to the threads of the replacement Pressure Switch.

NOTE

Do Not use Teflon tape as a thread sealer as small particles of the tape may break off and block the small gas passages in the torch.

5. Thread the replacement Pressure Switch into place on the Regulator/Filter Assembly. Tighten securely.
6. Connect the wires from the Pressure Switch wire harness, with the wires positioned as marked previously.
7. Reinstall the Power Supply cover.
8. Reconnect the gas supply and primary input power. Test the Power Supply for proper operation.

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SECTION 5 TORCH: SERVICE

5T.01 General Maintenance

NOTE

Refer to Previous "Section 5 System" for common and fault indicator descriptions.

Cleaning Torch

Even if precautions are taken to use only clean air with a torch, eventually the inside of the torch becomes coated with residue. This buildup can affect the pilot arc initiation and the overall cut quality of the torch.



WARNINGS

Disconnect primary power to the system before disassembling the torch or torch leads.

DO NOT touch any internal torch parts while the AC indicator light of the Power Supply is ON.

The inside of the torch should be cleaned with electrical contact cleaner using a cotton swab or soft wet rag. In severe cases, the torch can be removed from the leads and cleaned more thoroughly by pouring electrical contact cleaner into the torch and blowing it through with compressed air.



CAUTION

Dry the torch thoroughly before reinstalling.

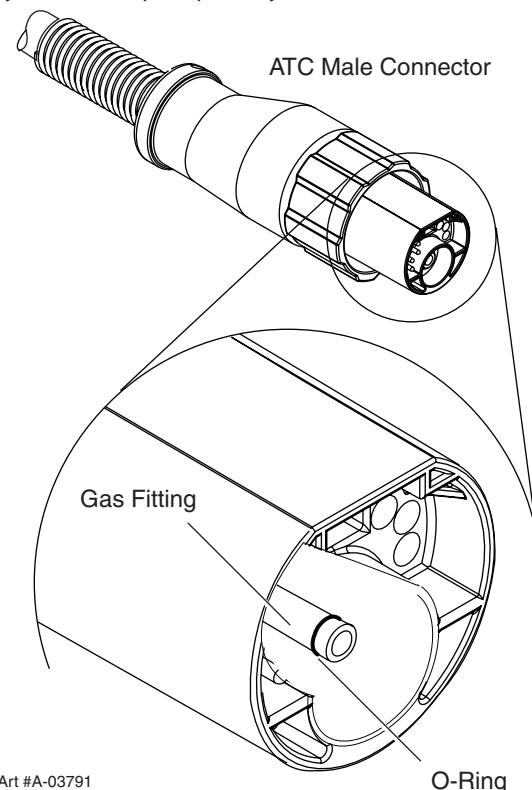
O-Ring Lubrication

An o-ring on the Torch ATC Male Connector requires lubrication on a scheduled basis. This will allow the o-ring to remain pliable and provide a proper seal. The o-ring will dry out, becoming hard and cracked, if the o-ring lubricant is not used on a regular basis. This can lead to potential performance problems.

It is recommended to apply a very light film of o-ring lubricant (Catalog # 8-4025) to the o-ring on a weekly basis.

NOTE

DO NOT use other lubricants or grease, they may not be designed to operate within high temperatures or may contain "unknown elements" that may react with the atmosphere. This reaction can leave contaminants inside the torch. Either of these conditions can lead to inconsistent performance or poor parts life.



5T.02 Inspection and Replacement of Consumable Torch Parts**WARNINGS**

Disconnect primary power to the system before disassembling the torch or torch leads.

DO NOT touch any internal torch parts while the AC indicator light of the Power Supply is ON.

Remove the consumable torch parts as follows:

NOTE

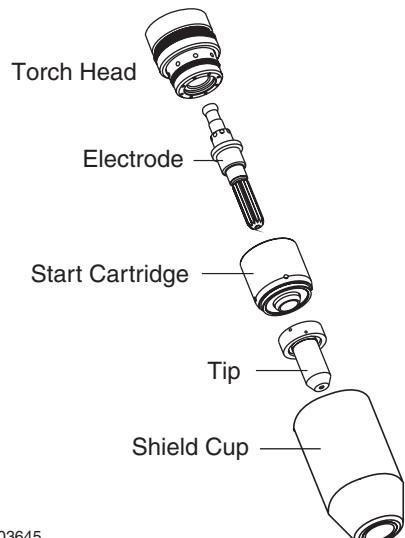
The shield cup holds the tip and starter cartridge shield cup in place. Position the torch with the shield cup facing upward to prevent these parts from falling out when the cup is removed.

1. Unscrew and remove the shield cup from the torch.

NOTE

Slag built up on the shield cup that cannot be removed may effect the performance of the system.

2. Inspect the cup for damage. Wipe it clean or replace if damaged.

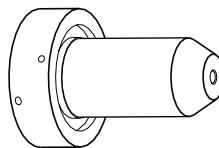


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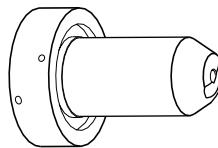
Consumable Parts

3. Remove the tip. Check for excessive wear (indicated by an elongated or oversized orifice). Clean or replace the tip if necessary.

Good Tip



Worn Tip

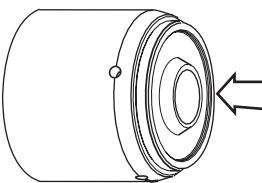


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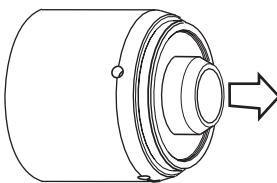
Tip Wear

4. Remove the starter cartridge. Check for excessive wear, plugged gas holes, or discoloration. Check the lower end fitting for free motion. Replace if necessary.

Spring-Loaded
Lower End Fitting
Full Compression



Spring-Loaded
Lower End Fitting at Reset
Full Extension

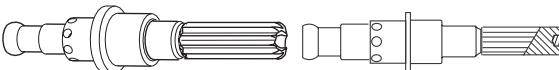


Art # A-08064_AC

5. Pull the Electrode straight out of the Torch Head. Check the face of the electrode for excessive wear. Refer to the following figure.



New Electrode



Worn Electrode

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Electrode Wear

6. Reinstall the Electrode by pushing it straight into the torch head until it clicks.
7. Reinstall the desired starter cartridge and tip into the torch head.
8. Hand tighten the shield cup until it is seated on the torch head. If resistance is felt when installing the cup, check the threads before proceeding.

SECTION 6: PARTS LISTS

6.01 Introduction

A. Parts List Breakdown

The parts list provides a breakdown of all replaceable components.

B. Returns

If a product must be returned for service, contact your distributor. Materials returned without proper authorization will not be accepted.

6.02 Ordering Information

Order replacement parts by catalog number and complete description of the part or assembly, as listed in the parts list for each type item. Also include the model and serial number of the torch. Address all inquiries to your authorized distributor.

6.03 Replacement Assemblies

The following items are included with the replacement power supply: input power cord and plug, work cable & clamp, gas pressure regulator / filter, and operating manual.

Qty	Description	Catalog #
1	CutMaster 39 Power Supply	3-3830
1	Surelok Model SL60 Torch	7-5204

6.04 Power Supply Replacement Parts

Qty	Description	Catalog #
1	Regulator / Filter Assembly Filter Element	9-0182
1	Input Power Cord with NEMA L6-20P plug	9-0215
1	Input Power Cord Adapter 230V	9-0217
1	Input Power Cord Adapter 120V	9-0177

6.05 Major External Replacement Parts

Item #	Qty	Description	Catalog #
1	1	Cover with labels	9-0173
2	1	Base Enclosure Assembly	9-0174
3	1	Tube, roll handle	9-0121
4	1	Front Panel	9-0175
5	1	Rear Panel	9-0176

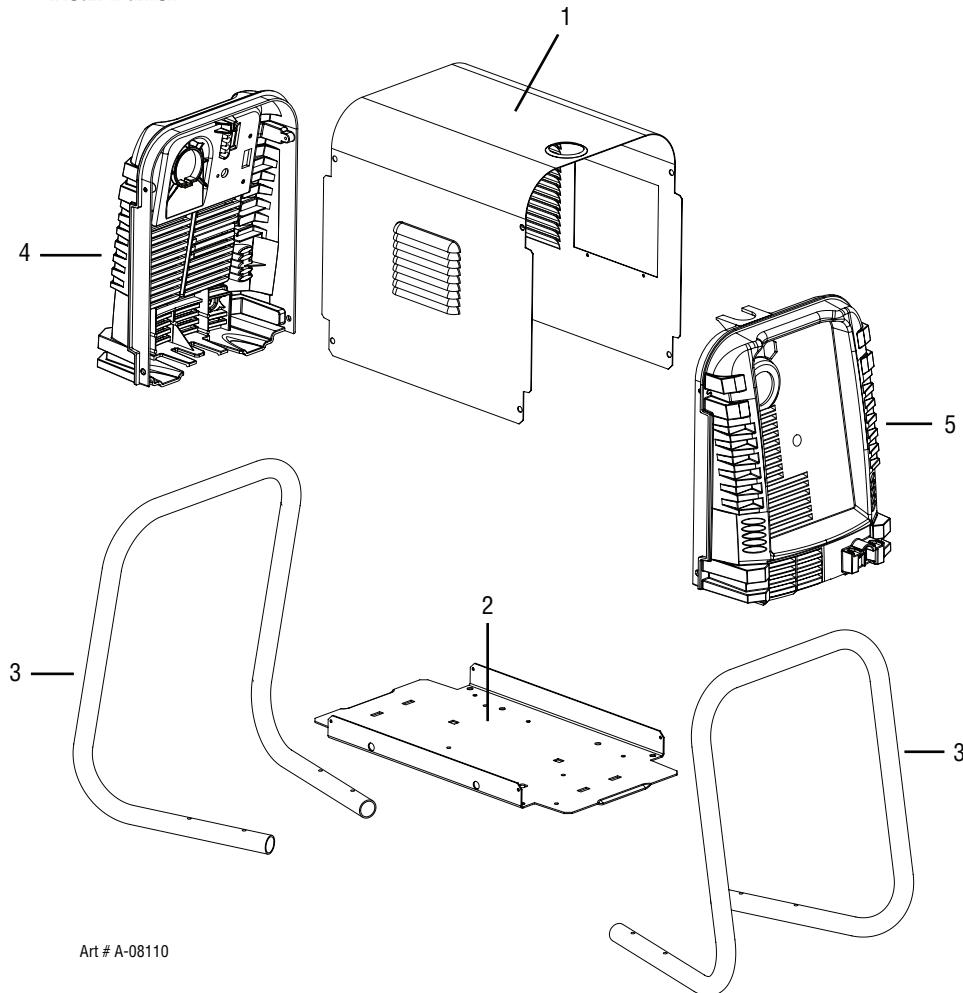
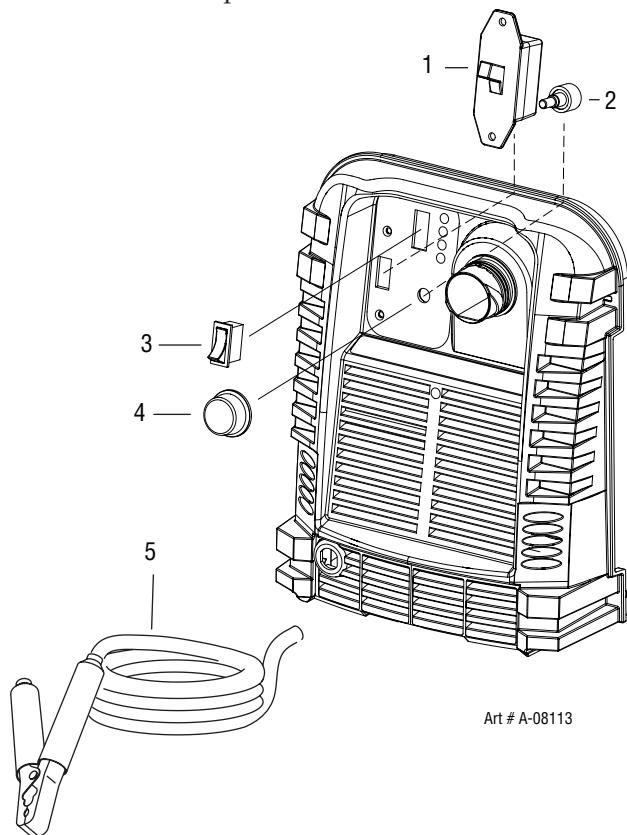
**NOTE**

Illustration may vary slightly from unit.

6.06 Front Panel Replacement Parts

Item#	Qty	Description	Ref.	Catalog #
1	1	On/Off Switch	SW1	8-4248
2	1	Output Current Control Potentiometer with wire harness		9-8527
3	1	Run/Set Switch	SW2	9-1042
4	1	Output Current Control Knob		9-8527
5	1	Work Cable with Clamp, 20 Ft / 6.1 m		9-8642



NOTE

Illustration may vary slightly from unit.

6.07 Left Side Replacement Parts

Item #	Qty	Description	Ref	Catalog #
1	1	PCB Assembly		9-0178
2	1	Diode Bridge	BR1, BR2	7-3345
3	1	Thermal Pad		9-4466
4	1	Input Power Cable with plug, for non-CE units		9-8660
4	1	Input Power Cable for CE units		9-8671
4	1	Input Power Cable for (CE) Australian units		9-8663
Not Shown:				
	1	Power Cable Strain Relief, for all units		9-0111

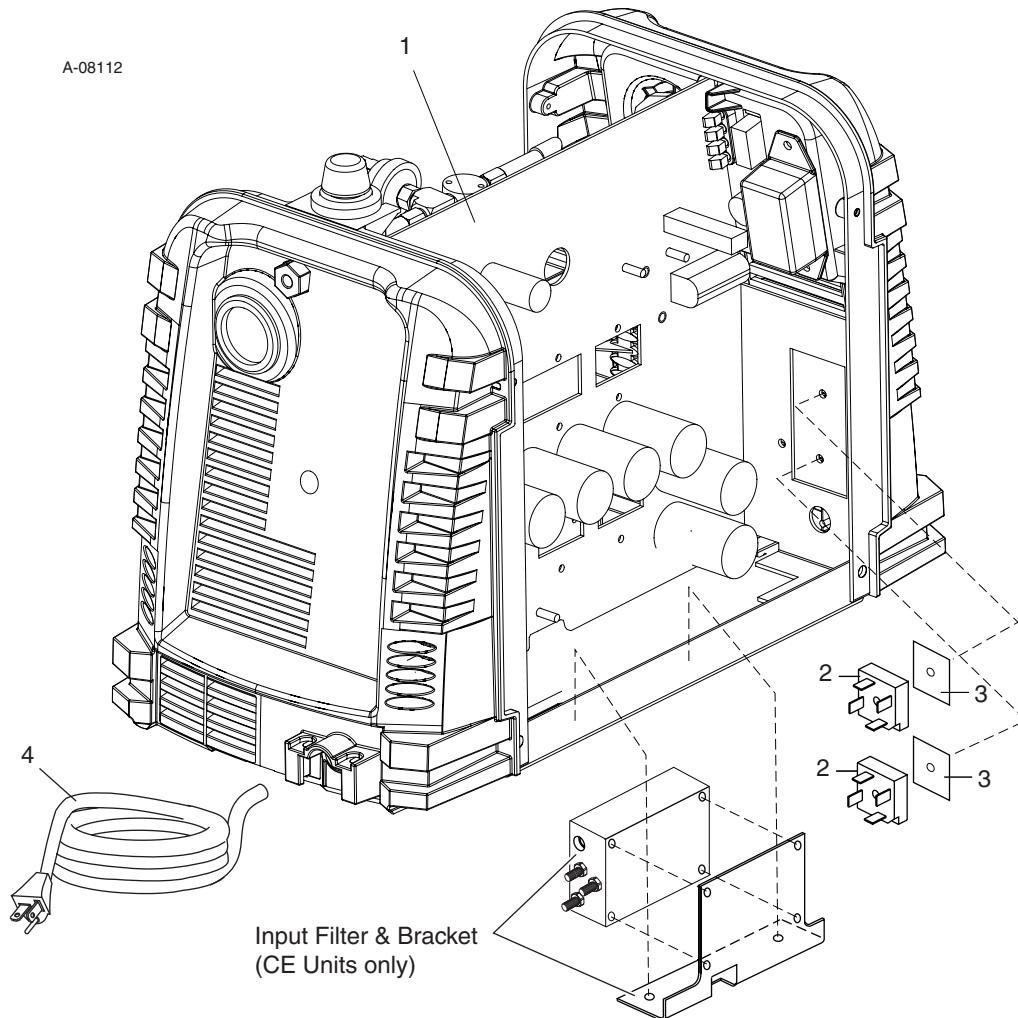
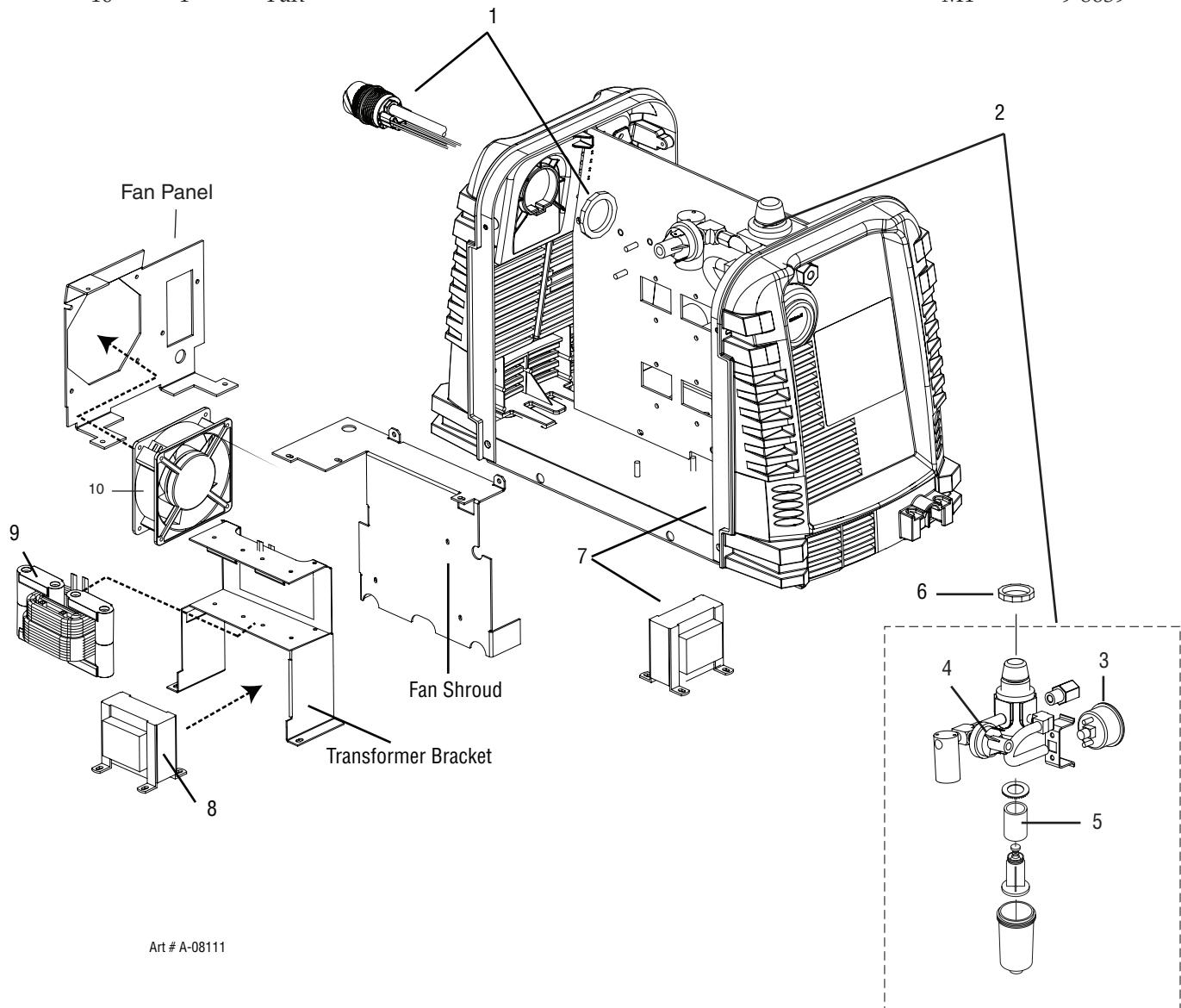
**NOTE**

Illustration may vary slightly from unit.

6.08 Right Side Replacement Parts

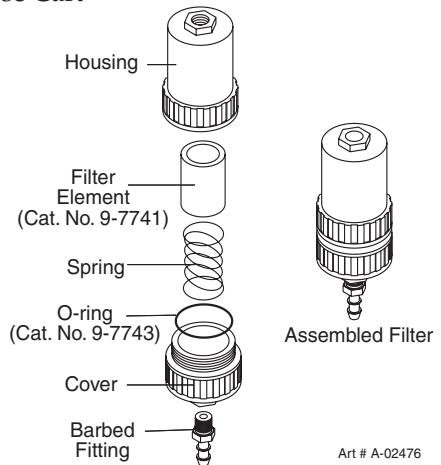
Item #	Qty	Description	Ref	Catalog #
1	1	Console ATC Assembly		9-8641
2	1	Regulator/Filter Assembly (includes Pressure Switch, Pressure Gauge, Solenoid)		9-0180
3	1	Pressure Gauge		9-0181
4	1	Pressure Switch	PS1	9-1044
5	1	Regulator/Filter Replacement Element		9-0182
6	1	Regulator Mounting Nut		9-0183
7	1	Assembly, Output Inductor	L1	9-8626
8	1	PFC Choke		9-8627
9	1	Main Transformer Assembly	T3	9-8625
10	1	Fan	M1	9-8639



Art # A-08111

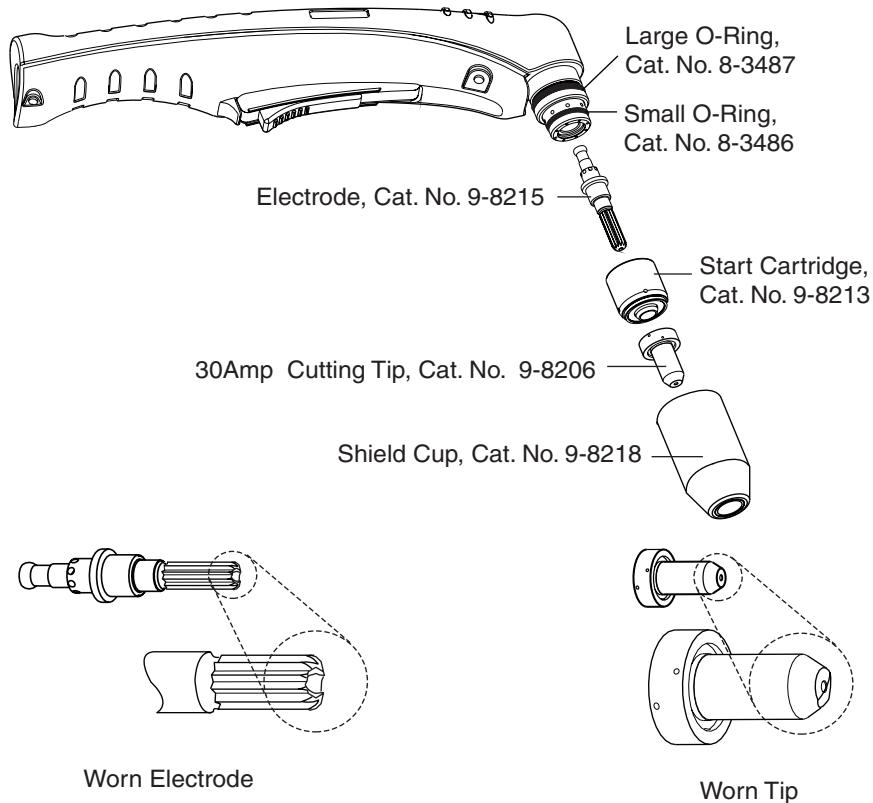
6.09 Options and Accessories

Qty	Description	Catalog #
1	120V, 15 - Amp Plug	9-8644
1	120V, 20 - Amp Receptacle	9-8645
1	Single - Stage Filter Kit (includes Filter & Hose)	7-7507
1	Replacement Filter Body	9-7740
1	Replacement Filter Hose (not shown)	9-7742
2	Replacement Filter Element	9-7741
1	Multi - Purpose Cart	7-8888

Single - Stage Air Filter

6.10 Torch Consumables

Art # A-03409



PATENT INFORMATION

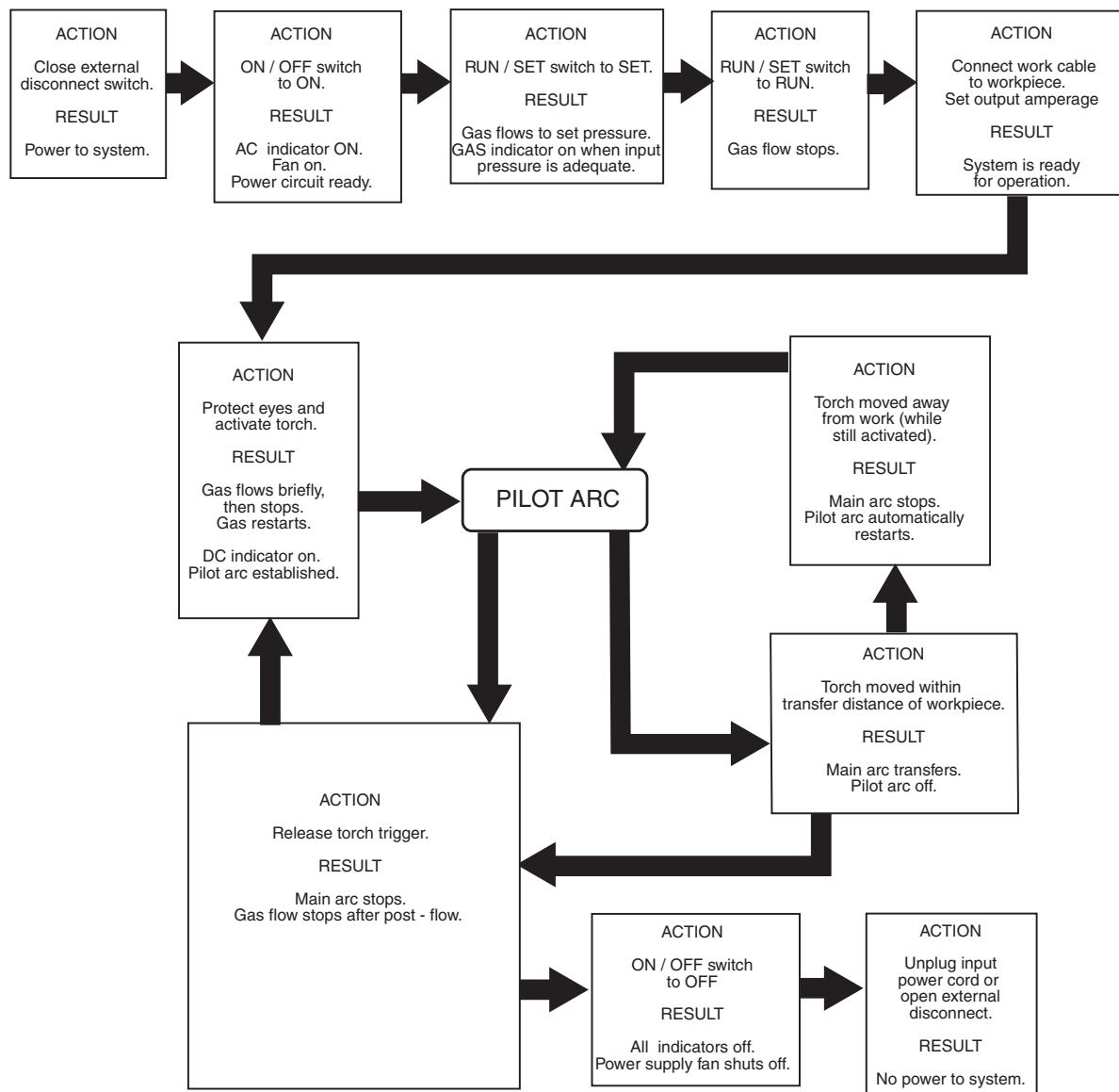
The following parts are licensed under U.S. Patent No(s). 5120930 and 5132512

Catalog Number	Description
9-8235	Shield Cap, Drag 50-60A
9-8236	Sheild Cap, Drag 70-100A
9-8237	Shield Cup, Body
9-8238	Shield Cap, Machine 50-60A
9-8239	Shield Cap, Machine 70-100A
9-8244	Shield Cap, Drag 40A
9-8245	Shield Cap, Machine 40A

NOTE

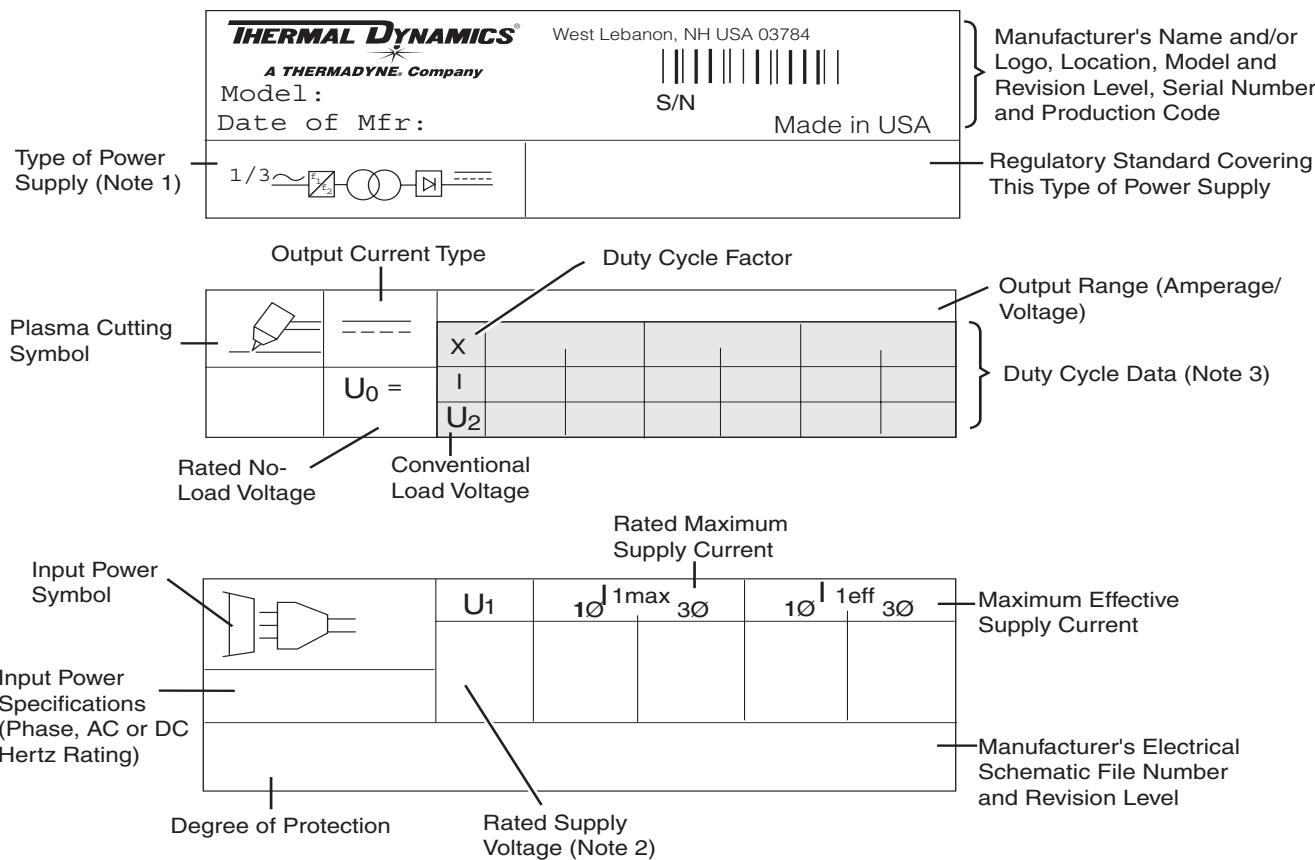
When operating the torch in a normal condition, a small amount of gas vents through the gap between the shield cup and torch handle. Do not attempt to over tighten the shield cup as irreparable damage to internal components may result.

APPENDIX 1: SEQUENCE OF OPERATION (BLOCK DIAGRAM)



A-03299

APPENDIX 2: DATA TAG INFORMATION



NOTES:

- Symbol shown indicates single- or three-phase AC input, static frequency converter-transformer-rectifier, DC output.
- Indicates input voltages for this power supply. Most power supplies carry a label at the input power cord showing input voltage requirements for the power supply as built.
- Top row: Duty cycle values.
IEC duty cycle value is calculated as specified by the International ElectroTechnical Commission.
TDC duty cycle value is determined under the power supply manufacturer's test procedures.
- Second row: Rated cutting current values.
- Third row: Conventional load voltage values.
- Sections of the Data Tag may be applied to separate areas of the power supply.

Standard Symbols

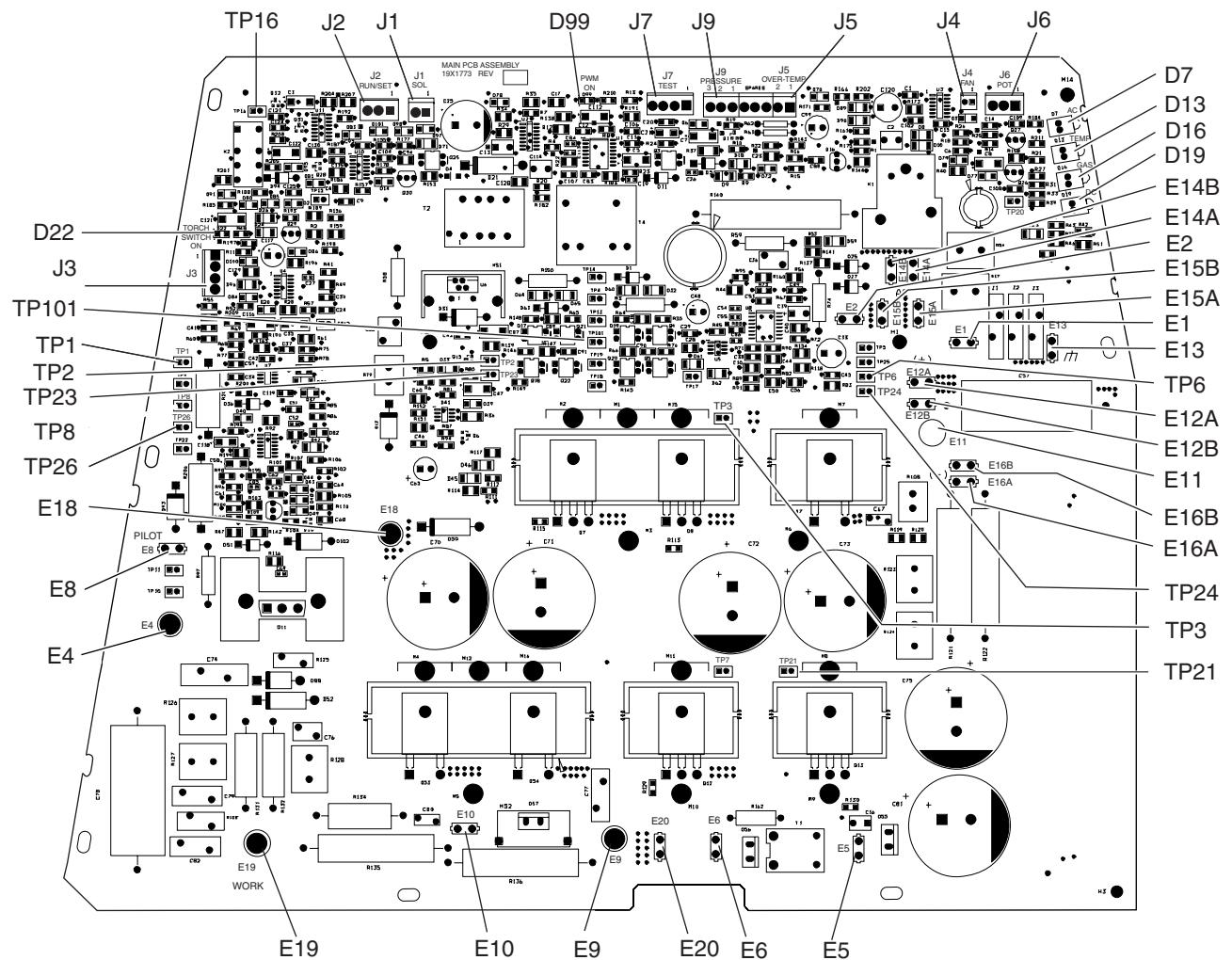
\sim	AC
$---$	DC
\emptyset	Phase

Art # A-03288

NOTE

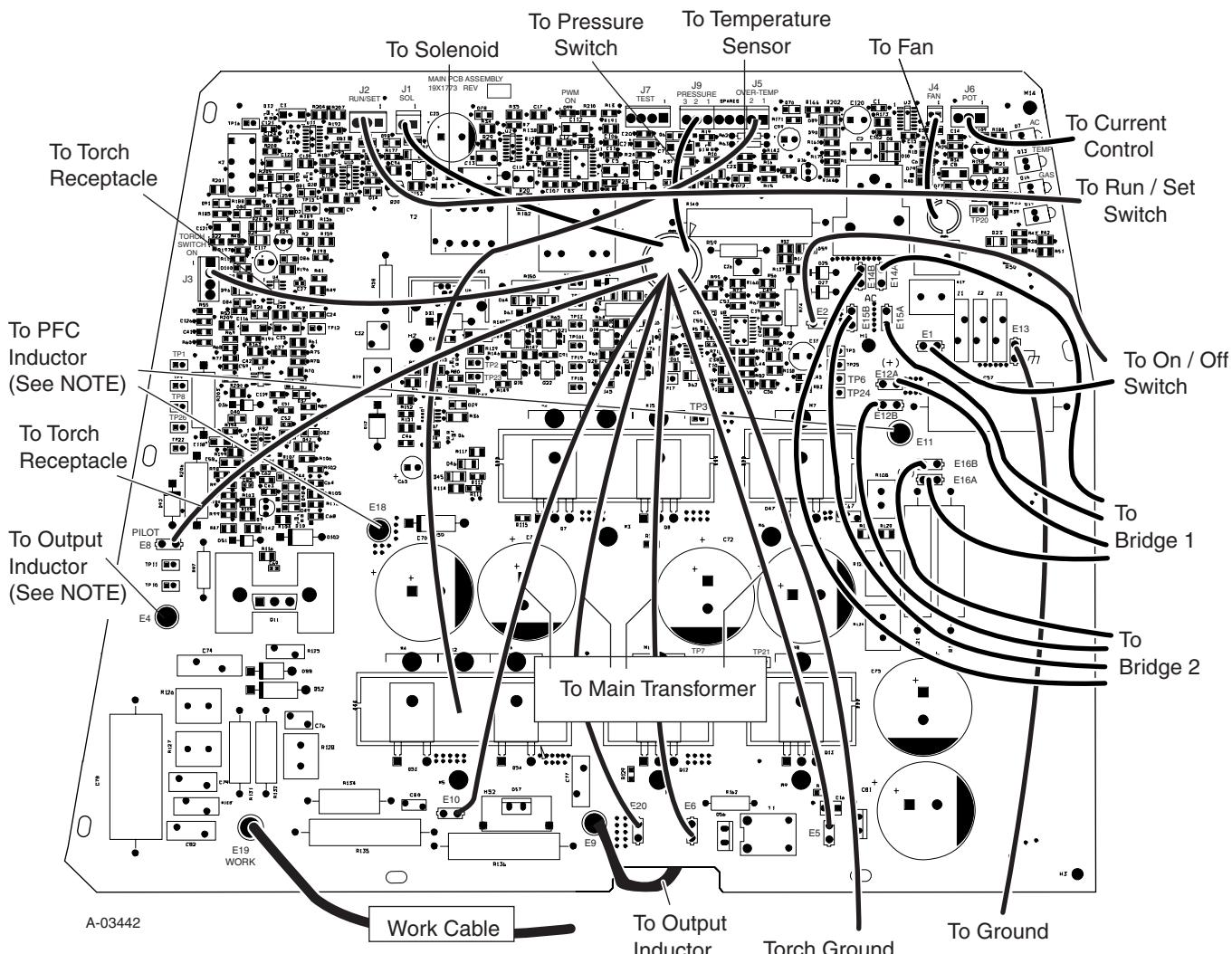
Sections of the data tag may be applied in separate locations on the Power Supply.

APPENDIX 3: MAIN POWER PC BOARD LAYOUT



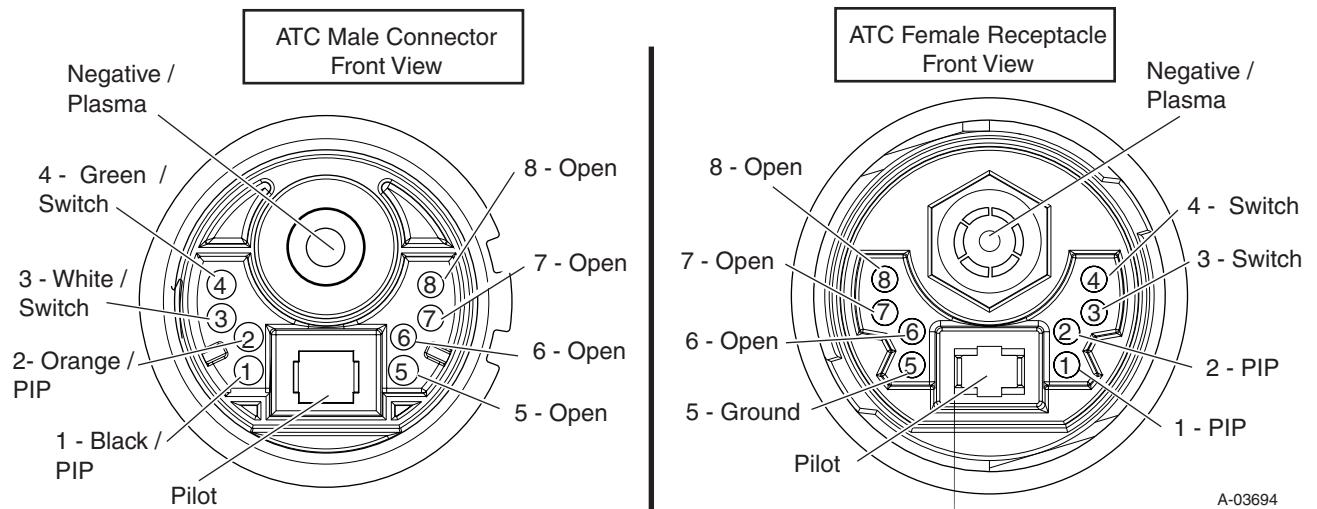
A-03441

APPENDIX 4: MAIN PC BOARD WIRING

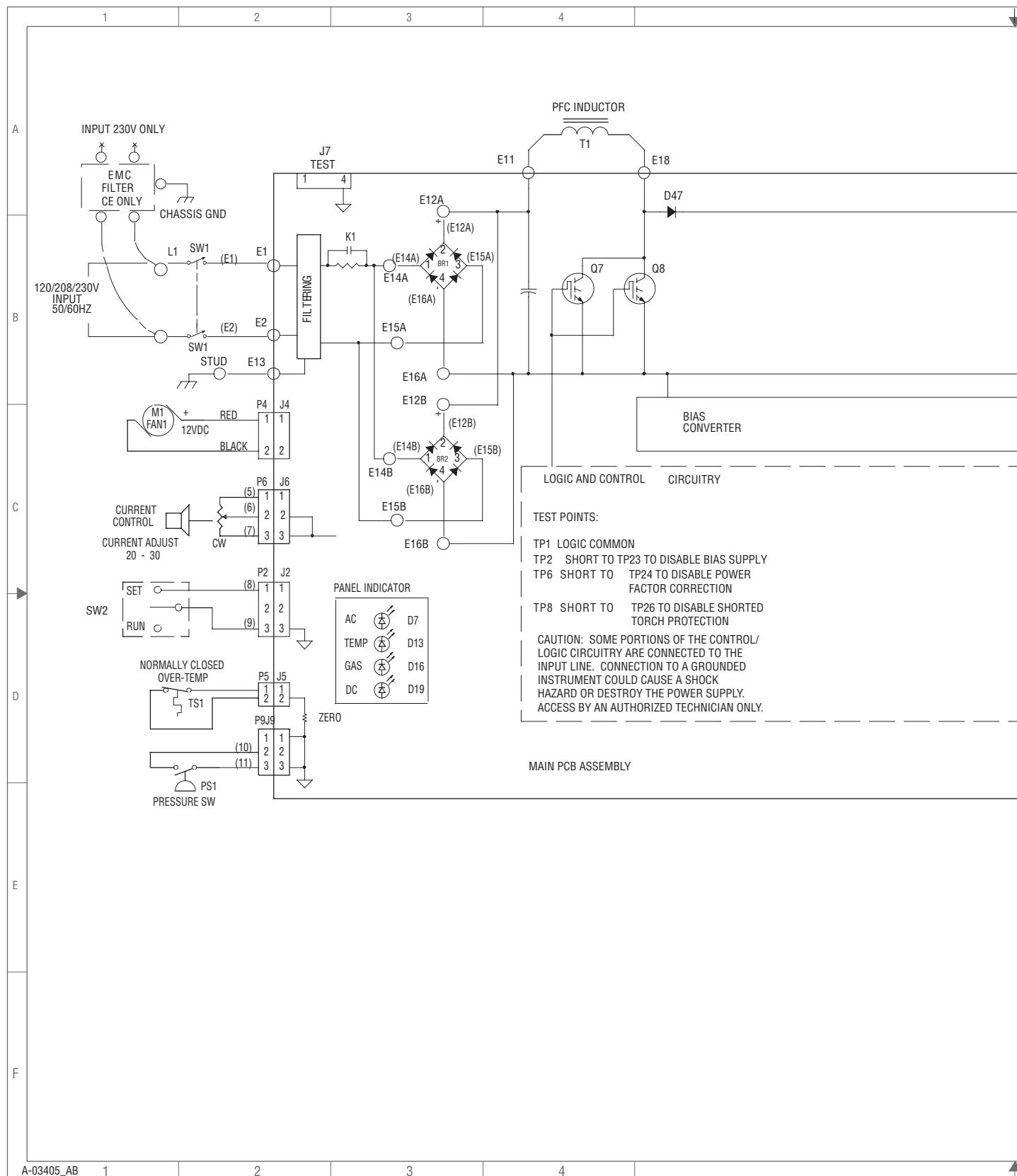


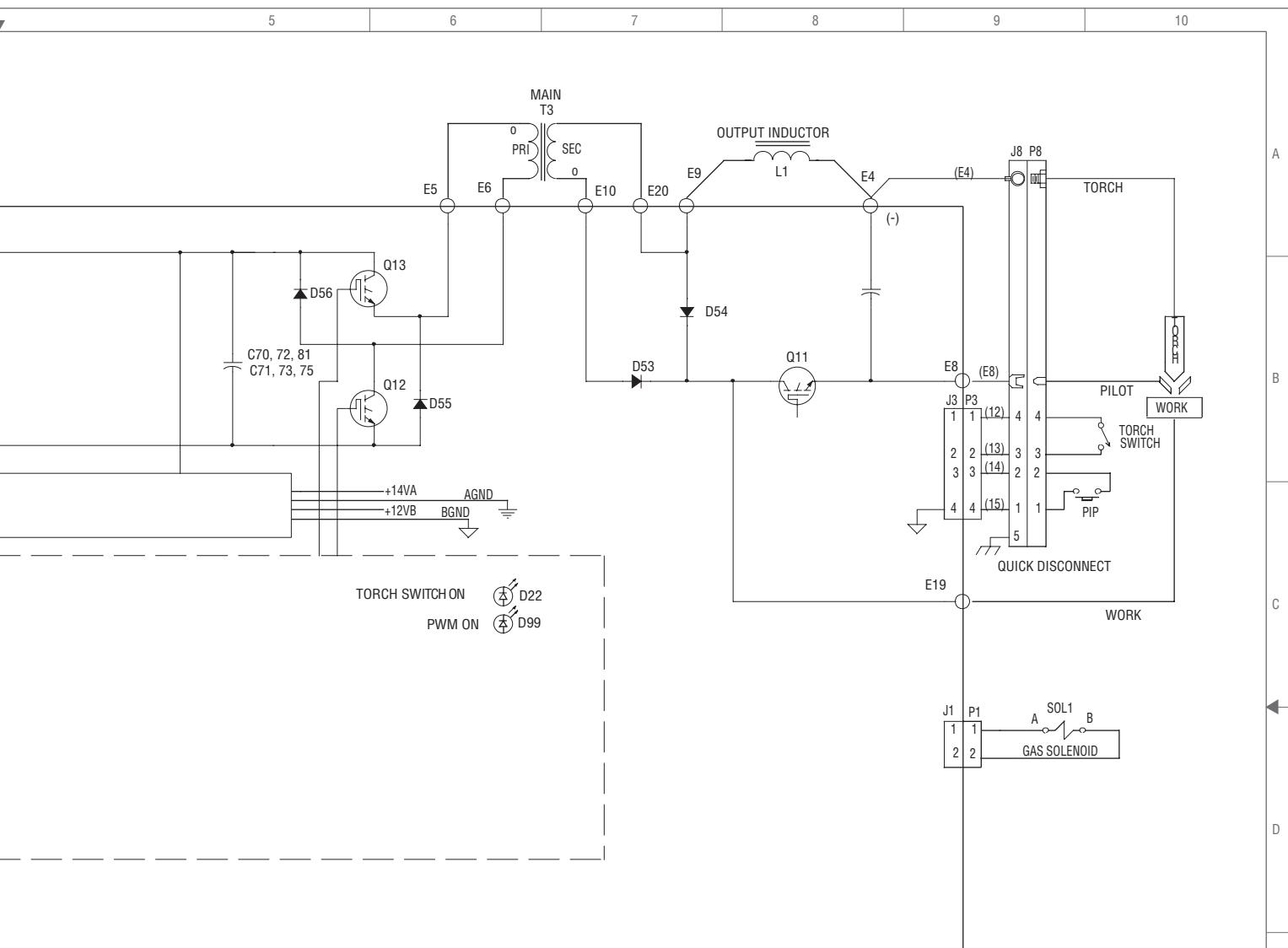
NOTE: Terminals E4, E11, and E18 are on the back of the PC Board.

APPENDIX 5: TORCH CONNECTOR DIAGRAM



APPENDIX 6: SYSTEM SCHEMATIC





COMPDESCRIPTION	LOCATION
TS1 OVER-TEMP. SENSOR	D2
M1FAN, 4.5" 12VDC	C1
PS1PRESSURE SWITCH	D1
SOL1GAS SOLENOID	D9
T1 PFC INDUCTOR	A4
T3 MAIN TRANSFORMER	A7
L1OUTPUT INDUCTOR	A8
SW1 SWITCH, ON/OFF	B2
SW2 SWITCH, RUN/SET	D1

Rev	Revisions	By	Date	Thermal Dynamics® <i>A THERMADYNE Company</i>		PCB No:
AA	REL ECO 100213	GCW	7/29/02	THERMAL DYNAMICS INDUSTRIAL PARK No. 2 WEST LEBANON, NH 03784 603-298-5711		Assy No:
AB	REL ECO 100333	GCW	10/04/02			Panel
AC	REL ECO 100535	DAT	2/27/03			Supersedes
AD	REL ECO B505	RWH	6/19/07			
				Information Proprietary to THERMAL DYNAMICS CORPORATION. Not For Release, Reproduction, or Distribution without Written Consent.		
NOTE:				Unless Otherwise Specified, Resistors are in Ohms 1/4W 5%. Capacitors are in Microfarads (UF)		
TITLE:				SCHEMATIC, CM38 120/208/230V SINGLE PH		
				ASE 50/60 Hz		
				Size	DWG No:	
				C	42X1089	
Last Modified: Tuesday, June 19, 2007 15:05:29						

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By THERMADYNE. 